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East Europe Report

SCIENTIFIC AFFAIRS

No. 671

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PROGRESS IN COMPUTER DEVELOPMENT OUTLINED

Sofia ZEMEDELSKO ZNAME in Bulgarian 21 Mar 80 p 3

[Article by Engr Zvonimir Pushkarov, deputy director of the Computer Engineering Institute: "The Present and Future of Bulgarian Computer Equipment"]

[Text] Computers are the most dynamic sector of present-day industry on a world scale. Developing as industrial production just in the 1950's, by 1990, according to UN data, it is expected to hold third place in the world in terms of the total product volume.

Due to the special concern shown by the BCP Central Committee in an exceptionally short period of time our nation has created and developed the production of computer equipment and this has become a strategic direction of industry. While at the beginning of the 1970's our nation virtually did not produce computer equipment, at present this sector is responsible for 4.3 percent of the volume of total industrial product. With decisive aid from the Soviet Union and in close cooperation with the other socialist nations, Bulgaria already has acknowledged successes in the area of peripheral tape and disc storage units and control units for them, data teleprocessing systems, medium-capacity electronic computers, immediate-access storages, microcomputers, electronic calculators and so forth. An extensive network of territorial computer centers in the nation has been equipped with the Bulgarian ES 1020-B and ES 1022-B electronic computers. The IZOT 310 minicomputer is used in solving various control and production problems at a number of plants and APK [Agroindustrial Complex]. Bulgaria is the largest exporter of peripheral storages in the countries of the socialist commonwealth.

The present stage in the development of our socialist society already is placing new, higher demands upon computer equipment. This is clearly apparent from the approved plan for the nation's development during the period of 1980-1981, in which the production of electronic and electronified products should increase annually by about 12-13 percent.

However it must be noted that in recent years the development of this equipment has been beset by a number of problems in its use by consumers.

The initial introduction of computer equipment was carried out at organizations which possessed highly skilled specialists in this area. But with the appearance of new generations of computers and particularly the mini- and microcomputers, computer equipment became available to a broad range of users and its mass application began. But as a rule, these users had neither the personnel nor the facilities for the independent elaboration of the software. For this reason they have avoided buying the universal computers.

The solution to this problem is of exceptional significance for the use of computer equipment for the puposes of the socialist organization of labor and the introduction of electronics into the national economy. The decisions taken in this area by the National Party Conference, the plenum of the BCP Central Committee held in July 1979, and particularly the instructions given by Comrade Todor Zhivkov at the national meetings at the end of October 1979 and 30 January 1980 have posed a number of major tasks for computer equipment as one of the strategic areas providing for their comprehensive solution. These relate primarily to improving the quality of the produced computer equipment with a continuous bettering of the price--productivity ratio, the development and introduction of problem-oriented complexes, and not lastly, the shortening of the time of the entire science--production--realization process, as a component part in the strategic direction of the intellectualization of labor.

In solving these problems an important role is to be played by the Computer Engineering Institute under the IZOT DSO [State Economic Trust for Computer Equipment], which is the sole organization involved in servicing and introduction in this area not only within the Ministry of Electronics and Electrical Engineering, but also in the nation.

An improvement in the quality of the developed products and the achieving of the ultimate heights in computer equipment have always been and remain at the center of attention for the institute's leadership. An indicative example in this regard is the development of the magnetic disc storage units. After the consecutive development of such units with a storage capacity of 7.25 and 29 megawatts, this year development was completed on a device with a capacity of 2 x 100 megabytes.

One of the basic areas in our activities is the across-the-board introduction of the microprocessor element in developing the products.

On this basis the institute has already developed several products, including the IZOT 0250 desk computer designed for recording and processing economic information and storage on flexible magnetic discs.

The development of problem-oriented complexes (POK) is a new area in the activities of the institute. Here first of all one must mention the ESTEL integrated data teleprocessing (remote processing) system. It contains hardware and software making it possible for many distant users to employ computers.

Another problem-oriented complex is the ASUTO system for automated processing of trade information and for managing retail trade installations. The system can be successfully employed for managing consumer service combines, public dining facilities, and so forth.

Also of interest is the system for preparing data on magnetic tape and designed to replace the tape and card punchers, and allowing preliminary monitoring of the fed-in data on a screen.

Development has also been started in the area of automating word processing and monitoring the use of working time. There are plans to create various problem-oriented complexes for the needs of the APK, the DSK [State Savings Bank], and so forth. The avilability of a broad range of devices for the computer equipment and the development of problem-oriented complexes are a good basis for carrying out the program for the electronization of the national economy.

In counting on the elaborated program for improving the socialist organization of labor, we are doing a great deal to introduce automation into a number of managerial activities such as planning, labor reporting, control over decisions, and information support. An equally important role is given to the equipment for automating engineering labor as a decisive factor for its intellectualization. The mere automation of such a "simple" activity as the making of corrections in the text of a design document and which has alreadv been introduced allows us to shorten by more than 2-fold the time spent on this process with a sharp improvement in quality.

In spite of the indisputable successes in the development of the hardware and software for computers and in their application, what has been achieved is only a good basis for the pending work. And as yet exceptionally much remains to be done in order to carry out the party's demand to turn the Eighth Five-Year Plan into a five-year plan of technical progress.

10272
CSO: 2202

BRIEFS

NEW BIOLOGICAL CENTER--Construction began on a biological center of the Czechoslovak Academy of Sciences at Ctyri Dvory near Ceske Budejovice, South Bohemia. The center will contain the institutes of parasitology, entomology, experimental botany, hydrobiology, rural ecology, as well as development workshops and laboratories utilizing the most modern technological equipment. The 5-hectare center will cost over Kcs 200 million. [Prague MLADA FRONTA in Czech 3 Apr 80 p 7]

CZECH MEDICAL SOCIETY--The Czech Medical Society's 31,900 members include 19,900 medical doctors, 2,100 pharmacists and 9,900 specialists in health and other associated services. The members are active in the society's 53 specialized associations and 42 medical doctor associations. [Prague SVOBODNE SLOVO in Czech 3 Apr 80 p 4]

CSO: 2402

MICROCOMPUTER WORK STATION FOR TEACHING PURPOSES DESCRIBED

East Berlin RADIO-FERNSEHEN-ELEKTRONIK in German Vol 28 No 8, Aug 79 pp 496-497

/Article by Hans-Joachim Kirf, Horst Seibt and Lothar Ulrich, Friedrich Engels Engineering College, Goerlitz: "Microcomputer Work Station for Continuing Education"/

/Text/ This paper presents a microcomputer work station whose core is the ZE-1. The unit was developed and built at the Goerlitz Engineering School, by a working group of students, under order of the minister for electrical engineering and electronics. The unit was especially developed for teaching purposes. All typical operations of microcomputers can be performed and trained with it. In designing the unit, it was presupposed that the internal processes in the microcomputer should be very conspicuous, and that the use of import components should be essentially avoided. The unit is supplemented by a logic analyzer.

Our industry is using microcomputers more and more. To utilize these systems to their full capacity, special technical training is necessary for the users. For this reason, a student collective of the "Friedrich Engels" Engineering College at Goerlitz was charged with the youth objective "Construction of a Microcomputer Work Station for Training and Continuing Education at Engineering Schools", by the minister for electrical engineering and electronics. Their problem was to be solved by 15 July 1978. On 7 June 1978, the work station was presented in the presence of representatives of the MEE (minister for electrical engineering and electronics) and of the technical schools.

A design variant of the microcomputer work station was chosen which involves a device configuration based on the ZE-1 microcomputer. In comparison with the K 1510 microcomputer, the design of the microcomputer work station with the ZE-1 is more economical.

The following basic requirements are fulfilled:

By comparing several variants, an economically optimal variant was chosen, with the minimum capability for the purposes of training and further education.

Typical operations for microcomputers as well as typical application cases can be demonstrated with a microcomputer work station as designed.

The microcomputer work station was essentially designed with industrial plug-in units, modules, and units, taking into account the supply capabilities of GDR industry.

A possibility has been provide for copying this system easily at other engineering schools and other educational institutions.

The system is capable of operating independently of a host computer (KRS 4201).

The application areas of the microcomputer work station as designed are the following:

Demonstration of typical operating modes of microcomputers, in training and further education

Representation of dynamic processes on the data bus (logic analyzer)

Display of data register content of the microprocessor

Demonstration of the operation of complete process models, using microcomputers

Application of the microcomputer work station with business efficiency problems

Testing short user programs.

Structure and Technical Parameters

The configuration of the microcomputer system is shown in Figure 1. The basis of the system is formed by commercially available plug-in units (ZE-1). The following units are used:

ZEL 1	022-8890	(ZE Logic 1)
ZEL 2	022-8900	(ZE Logic 2)
ROM	051-9000	(Read-only memory)
RAM	051-9100	(Static read-write memory)

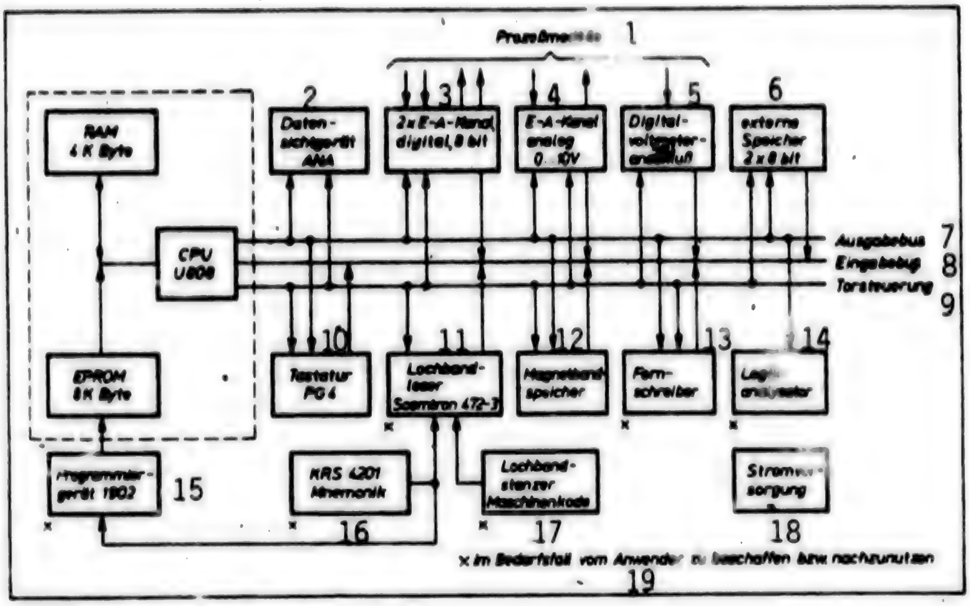

Figure 1: Block Circuit Diagram of the Microcomputer Work Station
Key:

1. Process models
2. Data display unit ANA
3. 2x I/O channel, digital, 8 bit
4. I/O channel, analog 0...10V
5. Digital voltmeter connection
6. External memories 2 x 8 bits
7. Output bus
8. Input bus
9. Gate control
10. Keyboard PG4
11. Paper tape reader Soemtron 472-3
12. Magnetic tape memory
13. Teletype
14. Logic analyzer
15. Programming unit 1902
16. KRS 4201 mnemonics
17. Paper tape punch, machine code
18. Power supply
19. To be procured or copies by the user, if necessary

The system is operated by the efficiency test unit 4 (PG 4), which was developed by the VEB Combine Robotron and which was subsequently used by the Goerlitz Engineering School. The PG 4 permits the use of the following functions:

Read from PROM plug-in units
Read and write from RAM plug-in units
Testing of ZE-1 programs (single-step or running operation)
Testing and troubleshooting the ZE-1 modules
Simulation of input and output respectively over only one channel.

Data and instructions are inputted through eight switches or keys, in machine code. Input and output data, addresses (14 places), gate

addresses, M-cycles, time steps (T 3 S, T 3 W) and accumulator contents are indicated through LED panels.

The alphanumeric data display unit ANA, produced by the VEB Combine Robotron, is used as the display screen terminal. The display is freely programmable and permits simultaneous presentation of a total of 256 characters. The character inventory comprises 64 numbers, letters, and special characters. A plug-in unit has been developed to control the display unit. This plug-in unit comprises 12 non-negating buffer amplifiers.

IO modules in digital and analog form have been installed for controlling the process models developed by the user. One of the modules consists respectively of two buffered input and output channels (8 bits). The output can be switched with ten TTL load units. The analog channel operates in a working range of 0...10 V with quantization steps of 0.1 V.

Another module makes it possible to staticize the readings of a digital voltmeter in the computer. An IA buffer memory of 2 x 8 bits is provided for programming support.

The storage space (RAM, EPROM) can be filled in many ways. The RAM region can be written on through a Soemtron 472-3 paper tape reader. The control of the latter is implemented through a special adapter plate. The read-only memories are written on with the daro 1902 programming unit. It is here advantageous for the programming unit to be controllable both manually and by a paper tape, which is created by an assembler program on the KRS 4201 minicomputer. The same paper tape can be inputted through the above-mentioned paper tape reader into the read-write memory. A paper tape in machine code can be created manually by means of a paper tape punch. When reading in, the correct initial loader must be chosen (see operating program).

A magnetic tape storage control unit was developed to expand the storage possibilities. An MK 42 cassette unit is used as the memory. The unit is preferably intended for preserving programs and mass data.

The connection to a teletype permits a favorable mode of communication with the microcomputer. It combines the function of keyboard, typewriter, paper tape reader and paper tape punch.

With modern electronic units, the prevailing trend is to house part of the measurement apparatus in the system. In order to meet this requirement, a logic analyzer has been developed which displays the logical states of the bus lines on a large display unit (TV unit). Dynamical errors can thus be detected.

The microcomputer work station requires five operating voltages (5 V, 12 V, 20 V, -9 V, -12 V). The design of the power supply included measures for overvoltage and overload protection. The power supply system is based on the application of the IL 72723 integrated circuit.

Some Remarks on the Technology

The power supply, the printed circuit boards for the peripheral equipment, as well as the industrially fabricated plug-in units (ZE-1) are housed in a printed circuit insert housing according to TGL 25 065. The modules have been developed on the basis of the Universal Experimentation Chassis ER 10. The plug-in units are connected with a special return wiring printed circuit board. The arrangement of individual plug-in units can be seen from Figure 2.

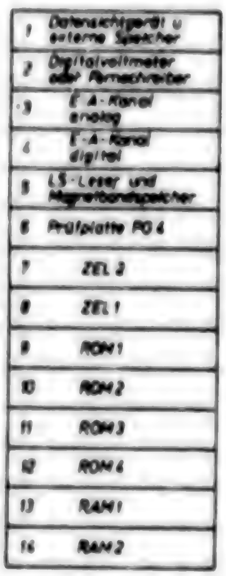

Figure 2: Panel Assignment
Key:
1. Data display unit at external memories
2. Digital voltmeter or teletype
3. I/O channel, analog
4. I/O channel, digital
5. Paper tape reader and magnetic tape memory
6. Test panel PG 4

A major portion of the housing volume is filled not only by the module inserts but by the power supply (printed circuit board, transformer, cooling body, capacitors). If the power supply should fail (internally), it is possible to guarantee an external supply of the unit by means of plugs.

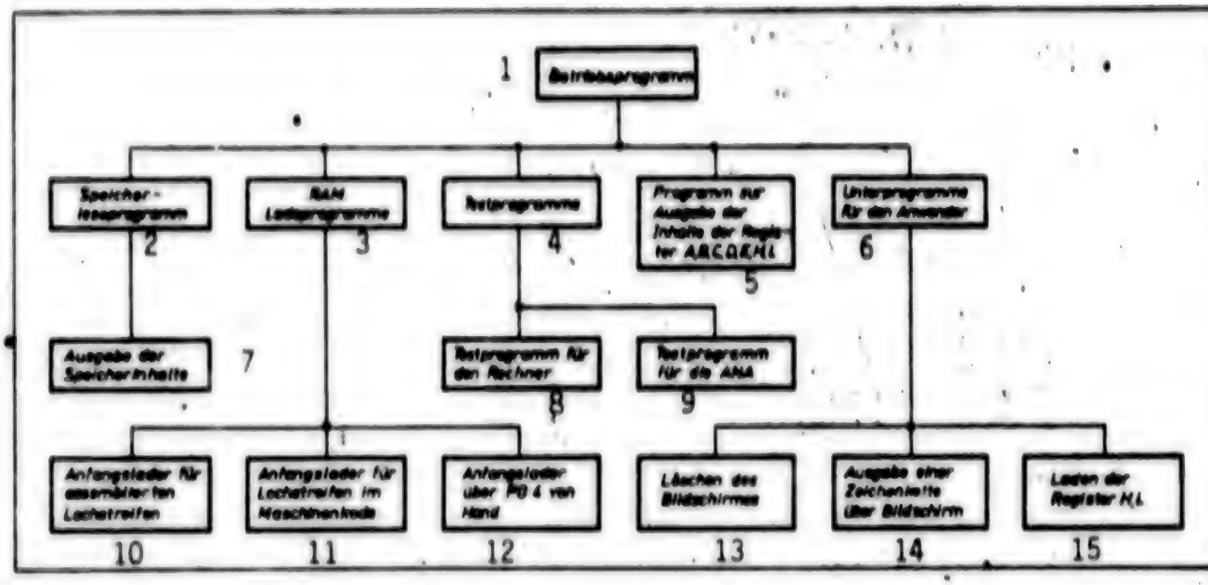

Figure 3: Overview of the Operating Program

Key:

1. Operating program
2. Storage read program
3. RAM loading programs
4. Test programs
5. Program for outputting the contents of registers A, B, C, D, E, H. L
6. Subprograms for the user
7. Output of storage contents
8. Test program for the cc~puter
9. Test program for the ANA
10. Initial loader for assembled paper tapes
11. Initial loader for paper tapes in machine code
12. Initial loader through PG 4, manual
13. Erase the display screen
14. Output of a character chain on the display screen
15. Loading the registers H, L

The peripheral equipment is connected by plug connections that are recessed in the front plate. The front plate plugs are connected with their associated printed circuit boards by means of ribbon cables, which facilitates easy access to the unit.

Operating Program

Figure 3 gives an overview of the operating program. In particular, the operating program is organized into RAM-, load-, memory read-, register display-, test-, and sub-programs. The survey clearly shows the various possibilities of entering data through the respective RAM loading program. The memory read program offers a control possibility for checking the inputted data. The data are displayed on the output panel (LED display) of the PG 4.

A program for displaying the current register contents (accumulator and six registers) is suitable for control and teaching purposes. The function test of the computer as well as of the display unit is provided by special programs. A series of subprograms was created to facilitate programming. The most important routines are listed in Figure 3.

The desired operating program is selected by operating the keyboard.

Work is continuously in progress on the modernization and expansion of the monitor. For example, it is intended no longer to use the display panel of the PG 4 but rather to work with the data display unit. This will also make possible block shifts in the RAM, which is important in program development and correction.

Indicated Applications

Two experimental complexes have been worked out for the microcomputer practicum. In the first part, the mode of operation of instructions and the handling of instruction lists, the basic mode of operation of a microprocessor when executing instructions, and the operation of the microcomputer should be learned.

The second part is intended as a preliminary stage for generating larger, user-oriented programs. In this experimental complex, a few program elements should be worked out and tested. This involves loops, parallel-serial and serial-parallel conversion, arithmetic operations, digital regulation, and industrial controls.

Parties interested in using the technical documents can direct their inquiries to the "Friedrich Engels" Engineering College in Goerlitz.

8348
CSO: 2302

TRAINING STATION FOR MICROCOMPUTER HARDWARE, SOFTWARE DESCRIBED

East Berlin FERNMELDETECHNIK in German Vol 20 No 2, Mar/Apr 80 pp 65-67

/Article by Dr Lonhard Richter, engineer, Chamber of Technology, and graduate engineer Guenter Warne, both of the Institute for Communications Technology, 1160 Berlin Edisonstrasse 63: "Introductory and Applications Instruction for Microcomputer Hardware and Software with the U 808"/

/Text/ For the rapid deployment of microelectronics, the practical training of engineers must be accomplished quickly. Many candidates have no possibility of attending courses at colleges and consultation support points. These primarily comprise four groups:

Engineers with many years of experience, but who have no contact with data processing. After an introduction, they want to choose further training themselves

Engineers with many years of experience who, in addition to their specialty, desire an overview of microprocessor applications

Economists and middle management, who are confronted with the use of computers and must make decisions concerning them

Development engineers with several years of practice, who wish to develop devices with microprocessor controls.

The first three groups are not so much interested in a course on independent programming or on device construction, as in understanding the function of the processor, the nature of programming, and of program generation. The latter group actually wants to attain programming skills and has a practical interest in operating the computer and in handling the system software of a microcomputer.

But these tasks cannot be accomplished without actual inspection and without actual experimentation. Every business or every educational institution, which independently addresses itself to these tasks, makes an important contribution to the rapid introduction of microelectronics.

Since the U 808 circuit is the first one ready for use, it must also be treated first (1).

1. Introduction to the Basic Functions of the U 808 Microprocessor

1.1 Function of a 'Training Station'

The hardware equipment must be designed to display the following functions:

Program input from a memory or keyboard in continuous or in single-step operation

Displaying the contents of essential modules of the microprocessor (program counter, accumulator, flags, input and output) on a display panel, which can be viewed by about 30 persons

Memory (minimum design) with 2 K byte ROM and 0.5 K byte RAM

A minicomputer that can be manually programmed during training (64 to 128 bytes) with program branching capability.

The software must have the following scope:

Several clear demonstration examples, such as conditional transfers, transport operations, and loops

A loading program for loading the RAM memory from the operating console

Output of register contents on indicator lights

Programs for addition, subtraction, formation of two's complement for training operations with binary numbers.

The limits of the capability of such a "training station" are determined by the level of programming training. The trainee must be familiar with the binary and hexadecimal representation of data storage locations. If possible, the training station should be equipped with a hexadecimal display and keyboard. In order to prevent misunderstandings, it should here be pointed out that the training station is not adequate for training programmers. For this purpose, it is necessary at least to learn and practice an assembler language, which requires a complete development system with the microcomputer (2).

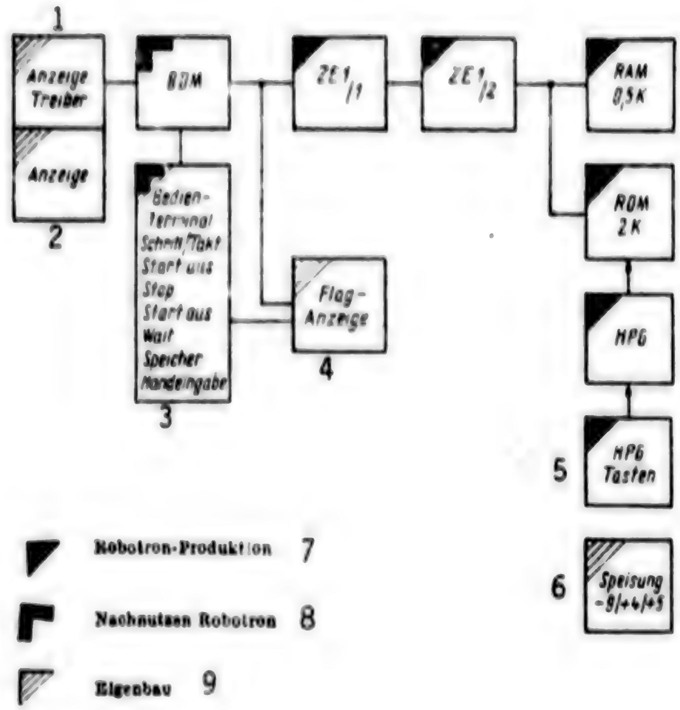

Figure 1: 'Training Station' for the Basic Functions of the Microcomputer

ZE 1/1, ZE 1/2 Modules of the ZE 1 Central Unit, BDA Operating Unit Connection, HPG Manual Program Generator, HPG-Keys Keys for Program Branching

Key:
1. Display driver
2. Display
3. Operating terminal, single step/clock pulse, start from stop, start from wait, memory, manual input
4. Flag display
5. HPG keys
6. Supply -9/+4/+5
7. Robotron production
8. Robotron reuse
9. In-house construction

1.2 Hardware and Software of the 'Training Station'

The training station is shown in Figure 1 as a block circuit diagram. It was constructed at the Institute for Communications Technology (INT) Berlin for introductory training. The ZE 1 microprocessor is its foundation. It is adequate and economical for its purpose (3). The modules which can be obtained from the VEB Robotron Dresden have been identified. A series of connecting modules have been added to the system, and these are being reused from developments of the VEB Robotron, Center for Research and Technology. The HPG (Manual Program Generator) and a display with lamp indicators were also developed. The operating unit was developed by Robotron, and was supplemented by hardware to display the content of the accumulator and of the flags.

A T 51 teletype can be used as a supplementary unit. The operating programs and a loading program were used after Robotron, in slightly modified form (4).

The display of the accumulator and flag content is implemented for single-step operation. A special key on the operating panel gives an interrupt, and the hardware places an input instruction on the input bus. The accumulator content is outputted in clock pulse T 1 of the PCC cycle. It is stored in a register that is already contained in the operating unit connection. The flag content is outputted at clock pulse T 4 of the PCC cycle, and it is stored in a special register. But previously, at clock pulse T 3, the accumulator content must again be inputted. This requires a small modification of the clock pulse activation of the register. Input data can be accepted from the oeprating panel by means of the instruction INP 0/7 ($4F_H$). The output OUT 3/7 ($7\ F_H$) goes to a register on the display panel.

The display panel indicates the register and flag contents bit by bit, by means of incandescent lamps. A lamp on means 1; a lamp off means 0.

The microprocessor can be directly programmed within the training framework by means of a so-called manual program generator. The manual program generator is built into the INT. The program is plugged into it by hexadecimally coded plugs.

Addresses and data lines from a REPROM memory module (connection picture of the U 552) are tapped from the computer through a plug connection. The REPROM module is removed from the memory and is contacted in the program generator. It then continues to be effective, while 64 or respectively 128 bytes are masked and are programmed by the plugs. The address lines are loaded with a low-power load, and the output is TRI-state. In this design, it is possible to plug in a 60-byte program in a few minutes.

1.3 Application of the 'Training Station'

The first aim is to explain the operating mode of a microcomputer by means of the instructions that are characteristic for processing. Besides transfer instructions and the readily demonstrable input/output instructions, conditional transfers can be displayed as the foundation of program versitility. The flag binary locations are the basis for programming conditional transfers. An example of the function of flags with logical instructions is demonstrated by a program unit, which is inputted from the manual operating unit:

ANA A	Reset the C flag
MVI-R(0 1_H)	Load an arbitrary register B through L with a 1 in Bit 0
MVI A (F C)	Load the accumûlator with 1's in Bits 2 through 7
ADD R	Add the 1 of the selected register to the accumulator. The accumulator was loaded with 255 - 3 = 252. After the first addition of 1, one obtains 253.
FLA	Hardware subroutine for displaying the flag at the accumulator. With 253 in the accumulator, only the S flag is set.
ADD R	The instruction ADD R as yet stands in the input keyboard, and the accumulator content is incremented by 1 at each operating cycle. After the display routine has been initiated, the accumulator content and the flag content are respectively displayed. The flags are set in sequence: first, the P flag; in case of accumulator overflow, the C flag and the Z flag, while the S flag is reset.

By juxtaposing the accumulator content and the reaction of the flags, their function can be made vividly clear.

The function of a stack can be similarly explained in clear fashion. The following experiment illustrates operations with positive and negative binary numbers.

For calculating with negative numbers, it is necessary to form the two's complement. The U 808 has a special instruction for this. The two's complement must be described by a subprogram. Furthermore, a number of subprograms should be available to implement addition, subtraction, and transport between two registers, as well as AND and OR. The subprograms must be started either by setting three to six keys in the input keyboard or by setting supplementary keys on the manual program generator or on plug-in minimemories.

The route through the manual program generator leads to especially clear programs. This method can also be slightly varied during training. This was, therefore, the route taken here. In addition, a keyboard can be connected at an arbitrary byte of the contactor panel of the manual program generator. This is the low-value byte of a transfer address. Program branchings can be implemented through this keyboard.

The program set up for practicing arithmetic operations contains the following basic elements:

Loading a register (e.g. Register D) through IN 0/7, from the keyboard
Loading the accumulator through IN 0/7 through the keyboard
Transport from Register B to Register D
Transport from the accumulator to Register D
Two's complement of the accumulator
Addition of accumulator and Register D
Storage of the result in Register B and display through OUT 3/7
Subtraction in the same fashion as addition.

Through an appropriate number of branch keys, the microprocessor can work in similar fashion as a hand computer. The accumulator content (through an additional key at the operating unit) and the result are likewise indicated. During training, favorable and unfavorable storage situations of intermediate results can be displayed during longer calculations, by changing individual instructions (e.g. varying the specification of registers!).

The division of operating functions through the keyboard at the operating unit (input numbers) and through the branching keys at the manual program generator (functions) is here more favorable than a pure software solution, with input of all data through the operating unit.

2. Training with the Hardware and Software of the K 1510 Microcomputer

After the basic functions of the U 808 have been worked out (1), training begins in actual programming as well as exercises with the basic software of the microcomputer. This part of the training must be performed very conscientiously, since a good knowledge of the equipment at the microcomputer work station and of the means for working out the program save the user very much time (5).

At the "training station", it is usual to represent instructions and data bit by bit. In contrast to this, a hexadecimal representation is used, especially so that the machine-oriented symbols will be easier to read. It is advantageous but not necessary if the operating function of the computer, which will be used after training, can also be practiced.

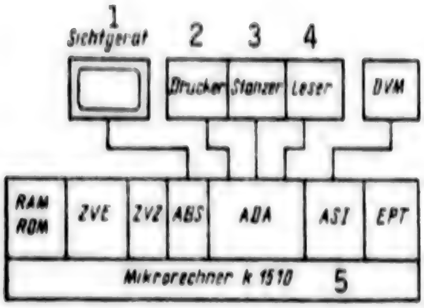

Figure 2: Work Station for User Training
ZVE Central Unit, ZVZ ZVE Addition, ABS Connection for Display Screen, ADA Connection for SIF 1000 Units, ASI Connection for Standard Interface SI 1.2, DVM Digital Voltmeter of the SEDM 31 Series, EPT Real-Time Program Tester

Key:

1. Display Unit
2. Printer
3. Puncher
4. Reader
5. Microcomputer K 1510

For this reason, the computer K 1510 is used, since currently it is the most widespread. Training takes about six weeks. It includes practical work at the computer, once a week for six hours, as well as independent exercises and study time. The goal is to implement the training as directly as possible in the user businesses.

The computer corresponding to Figure 2 was built at the INT (Institute for Communications Technology) for these purposes. It has both the components of a program development station and specialized peripheral units. It has been equipped with a standard interface SI 1.2 (6) and with a digital voltmeter, in view of the preferred use of the ESDM-31 system of the Erfurt Radio Works.

The "Training Station" can offer a practical introduction to the use of the SI 1.2. The supplementary unit to the ZVZ (Central Unit Supplement) is intended to demonstrate convenient interrupt handling (priority, masking, complete saving of registers).

Table 1 is a general collection of learning objectives, combined with the necessary software and user activities. The training tasks are listed in the first column, and all the important steps of program generation have been entered there. The associated programs are listed in the second column, and the respective learning objective is listed as the result in the third column.

Table 1: Exercises and Software for Program Generation

Purpose of the Exercise	Basis Program	Result
Writing programs in mnemonic code	BLAP	Source program tape
Learning assembler language	BASS	Loading tape and list
Testing program by test points	BTES	Corrected loading tape
Real-time test of programs	(ASI-PR)	Finished program and running times

BLAP Basis Paper Tape Preparation Program,
BASS Basis Assembler
BTES Basis Test Program
ASI-PR Programs for Activation over SI 1.2

The training tasks concern special subprograms, for example operation of the SI 1.2, interrupt routines, or measurement station operation. They must be worked through independently by the trainee, in all component steps, from concept to finished program. To prevent the learning process from being weighed down in the beginning by too many operating functions, the use of a host computer and the associated cross software was dispensed with.

The training method described here has always been successful when workers with similar aims have a practical preparation for the use of microcomputers. If direct practical relevance does not exist, the recommendation would be to participate in a methodologically more generalized course at a college or technical school. The training measures we have discussed also are not intended as a substitute for the device-specific user training of the computer industry.

BIBLIOGRAPHY

(1) Höhne, M., The U 808D Microprocessor. RADIO FERNSEHEN ELEKTRONIK (Radio Television Electronics) 26 No 5, pp 145-160, No 6, pp 187-188, 1977.

(2) Schuppe, W, Leistner, D., Microcomputer Programming. BERICHTE ZUR NACHRICHTENTECHNIK (Reports on Communications Technology), Vol 1, INT Berlin, 1978.

(3) Description ZE 1, Company Report, VEB Kombinat Robotron Dresden, 1976.

(4) Warme, G., Graffunder, B., Microcomputer Application, Device Technology. BERICHTE ZUR NACHRICHTENTECHNIK (Reports on Communications Technology) Vol 7, INT Berlin, 1980.

(5) System Description MRS - K 1510. VEB Kombinat Robotron Dresden, October 1977.

(6) Baumann, W., et al., Standard Interface of Electronic Measurement Technology, REIHE AUTOMATISIERUNGSTECHNIK (Automation Engineering Series) Vol 165, Berlin, VEB Technik Publishers, 1977.

(7) Richter, L., Warme, G., A Training Station for an Introduction to Microprocessor Technique, INT Reports 1, No 1, pp 17-20, 1979

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OVERVIEW OF COMPUTER PARK, UTILIZATION PRESENTED

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[Article by Gyorgy Badacsonyi, deputy main department head in the Ministry of Finance: "The Role of Computers in State Administration"]

[Text] Resolutions pertaining to the Computer Technology Central Development Program (SZKFP) set forth the chief developmental goals. The most important of these are the following:

— During the Fifth 5-Year Plan the resources of the SZKFP had to be concentrated on, among other things, the efficient, economical and coordinated satisfaction of the information needs of state administration. In the interest of supporting their tasks stressed development was justified for educational and research (organization) institutes and other organs managing from a single budget.

-- The chairman of the KSH [Central Statistical Office] created as the third base of the central state administrative remote data processing network--along side the computer centers already working for the PM [Ministry of Finance] and the OT [National Planning Office]--the State Administrative Computer Service (ASZSZ) and beginning in 1973, with a gradual development of capacity, the OT Computer Center (OTSZK) was to carry out the newly arising tasks of the KGM [Ministry of Metallurgy and the Machine Industry], NIM [Ministry of Heavy Industry], the Kip. Min. [Ministry of Light Industry] and the OAAH [National Material and Price Office], primarily those interdependent with national economic planning.

-- These developmental goals had to be realized in such a way as to increase the number and ratio of computers of socialist and domestic origin, acquiring computers of capitalist origin only in specially justified cases, increasing the level of computer technology services in parallel with a broad expansion of ESZR [Uniform Computer Technology System] computers and ensuring the homegenity of the computer park.

During the past 10 years--primarily as a result of the gradual realization of the program approved in 1971--the basic technical and applications conditions of a computer technology culture have been created as follows:

-- During the Fourth and Fifth 5-Year Plans we realized the computer data processing of the basic guidance, and in some places operational, information of central state administrative organs. The spread of computer technology in these areas made possible a more efficient handling of large volumes of data and a relatively swifter and more flexible high level information and data service. Systems development by functional organs (the PM, OT and KSH) and a few organs with national authority (the MNB [Hungarian National Bank] and SZOT [National Council of Trade Unions]) progressed significantly in the direction of complexity. The computer base of the ASZSZ developed also, although about 2 years late because of the delay in issuing export permits for US computers, and the basic conditions were created for carrying out the tasks which had been set.

-- Beginning in the 1970's computer processing systems developed in a number of branches also. Within this framework data banks of relatively significant size serving the goals of branch guidance came into being (at the MEM [Ministry of Agriculture and the Food Industry], NIM and KkM [Ministry of Foreign Trade]). By the end of the Fifth 5-Year Plan the introductory phase for population records was completed and the development and mechanization of property records and other national, branch and special area records were begun. Computer initiatives have appeared ever more strongly in recent years in regard to local administration also. Computer use by budgetary organs is still strikingly low in technical administrative areas. Stepping this up will be a task for future periods.

-- A computer technology developmental conception for education was worked out in 1968 and was raised to the program level by a GB [Economic Committee] resolution in 1971. The computer technology general and specialist training activity of educational institutions developed on the basis of this and the foundations for this development were provided by the development of computer technology tools for the institutions. In the past 7-8 years about 70,000 people received general computer technology training in our educational institutions and more than 20,000 people took part in specialized training. The computer capacity of the educational institutions served to a large degree to provide computer technology support for university research and at the same time contributed to the development of the guidance and information activities of the institutions.

-- The great majority of the 62 computers of research institutes under the supervision of the Hungarian Academy of Sciences are small computers. The great majority of these carry out special research tasks and most of them are working in two institutes whose basic activity is the development of computer technology devices and systems. In addition, the MTA [Hungarian Academy of Sciences] SZTAKI [Computer Technology and Automation Research Institute] operates a computer network which makes it possible for a number of research institutes, some of them in the provinces, to have access to a computer even though they have no computer or have one of insufficient capacity. The development of scientific methods is making it necessary for research institutes cultivating a number of branches of science to use

computer technology devices and methods, often in combination with other research tools and methods, in areas other than computer technology research.

With the great development of the past 5 years we have achieved a suitable level of opportunity as a whole in the numerical development of machine capacity and applications. But the principle of selectivity and differentiation was not realized evenly in this development. We mad progress in compatibility and in applying the principle of product families with the acquisition of ESZR machines. But this has not developed satisfactorily and thus the organizational and institutional conditions for applying the new technology have not been ensured at either the national economic or institutional level. This is due to the backwardness of organizational culture. The development of remote data processing systems is progressing slowly in the absence of these conditions. Thus the contradictions of development can be attributed only in part to outside factors (such as the embargo and the slower than planned realization of the ESZR program) or to the natural conditions of the initial stage of development.

Efficient utilization can be achieved in budgetary areas also only with a much more determined concentration of material and intellectual resources and with a stricter application of central guidance and coordination.

1. The Computer Park

Table No 1 shows the number of units and the gross value of computers operating in the area of the national economy and at budgetary organs therein at the end of 1977.

The forint values of small, medium and large computers include the value of the computers and of auxilliary equipment.

Table No 1.

	Small, medium and large computers		Mini- and micro-computers	
	Units	Billions of forints	Units	Billions of forints
National economy total	521	11.4	330	0.4
Budgetary organs	171	3.0	104	011

a. Size Composition

Despite the significant number of units the value of the mini- and micro-computers at budgetary organs represents a quite small proportion. But it

should be noted that their number has been increasing at a swift pace in some areas recently (for example, at MTA institutions and in some institutions of higher learning). The institutions of higher learning judge their significance differently from the viewpoint of goals and needs.

The ratio of large machines (1.8 percent in units and 18 percent in gross value) shows a slow increase. It was not possible to put into operation a larger number of large category machines because of the difficulties of organizing large scale information systems for computers, because of the lack of financial resources and for embargo reasons. The change in machine size distribution, as compared to 1970, is healthy--because the ratio of small and large machines is increasing.

The utilization of computers, achieving the goals or the economical realization of the goals depends on the configurations, the structure of the systems. These are deficient to a greater or lesser extent almost everywhere. The building up or completion of systems follows the acquisition of machines with a delay of several years.

In these cases--despite significant investments--the possibilities hiding in the systems remain unexploited for a long time. In addition to a deficient hardware structure there are not those fundamental software tools (operational systems, data base management systems, TP [stored program] monitors) which would support the utilizaiion of these systems in an interactive, on-line (direct) environment. This causes a great deal of extra manual work in off-line (indirect) linkages.

It is also a problem that the building up of remote data processing networks is progressing slowly because of the lack of technical conditions or financial resources. The difficulties of organizing systems represent a further problem in utilization of computers.

Building up the large computer and machine systems needed for large information systems, for scientific research, etc. is running into embargo difficulties, as we have mentioned already, in addition to the financial and foreign exchange problems. Thus it has been necessary in advance to plan for lower levels of storage capacity in relatively large machine systems. In some cases the processing capacity realized is significantly lower than what would be possible. Thus the systems which could be built on the majority of the large capitals machines which have been purchased have a reduced configuration. The operational systems of the machines use up a significant proportion--30-50 percent--of the storage capacity purchased up to the embargo limit.

In accordance with the pertinent government resolutions and in the interest of making possible broader use of ESZR machines the Inter-Ministry Computer Technology Committee (SZTB) has developed and conducted an acquisition policy within the framework of which control systems, magnetic disc units, line printers and software tools of capitalist origin have been acquired for use with socialist devices where necessary.

The poor locations of computer centers, machines and machine systems and the provisional or emergency solutions also often hinder the development of an adequate structure (location of peripherals, machine-to-machine links, etc.). The disadvantageous locations also play a role in the ratio of technical problems.

b. Age Composition

The average age composition of the machine park is favorable at present. At the end of 1977, 18 percent of the park was older than 7 years and the age of 28 percent was about one year. The age composition of the small category machines, representing the overwhelming part of the park, was more favorable than the average; only 13 percent were older than 7 years while 32 percent were one year old. The average age of the larger category machines was higher. In 1977, five of the 13 units worth more than 500 million forints were 7 years old or older.

The physical and moral obsolescence of the machines usually takes first place in justifying replacement needs. But, in my opinion, the definition of this is not unambiguous and often is not precise.

Physical obsolescence--which is the primary standard under our conditions, with a few exceptions--must be characterized by the frequency of technical problems, the increase in maintenance costs and the possibilities of parts supply. The gross-net value relationship does not offer an approximation because of the unreality of the amortization rate extablished for the budgetary organs (16 years). The contradictions in down-time and operating costs are suggested by the development of them which deviates significantly from age. To a large extent the signs pointing to physical obsolescence are dependent on the type of machine, location, operation, level of maintenance and the provision of environmental conditions. To a large extent these are determined with the selection of the machines.

According to experience it is justified to calculate the physical obsolescence of Western machines up to that point after which the manufacturing firm no longer undertakes to supply parts. In the case of ESZR and other socialist machines it would be justified to tighten up quality acceptance and the exploitation of guarantee rights.

After these antecedents, it seems justified to set the principles and norms for judging the physical obsolescence of the machines uniformly for enterprises and budgetary organs--in accordance with the experiences of supervision--at 10-12 years in the case of capitalist equipment and at 7-8 years for socialist machines in such a way as to be in harmony with the magnitude of the amortization keys.

The criterion for moral obsolescence also hides many subjective elements because it depends to a large extent on the harmony of the machine selected and the needs, on the purpose of the use, on the organizational solutions,

on compatibility, etc. The Western machines are classified more favorably from the viewpoint of moral obsolescence. Frequently the new ESZR machines (with the exception of the R-40) are classified as more morally obsolete than the old Western machines (for example, by the MTA institutes).

It can be seen from this that from the viewpoint of "moral obsolescence" or "being out-of-date" a significant role is played by an initial lack of harmony or a later breakdown of harmony between the machine selected (acquired of acquirable) and the needs or goals of the user.

In the case of morally obsolete machines it is sometimes possible to regroup them, after a certain time and suitable preparation, to areas where they can still be used to a limited extent. There has been such regrouping recently in several areas.

This solution is still not used widely enough. Practice shows that many of the machines keep working at their original base until they are scrapped. Satisfying the increasing need for capacity usually takes place by putting more new machines into operation. Thus far the budgetary organs have hardly transferred a machine or scrapped the most critical; to which the interest in proportional renewal funds contributes.

In the future machines which should not be scrapped, which are morally obsolete from the viewpoint of concrete tasks and the needs of the user but which are still in a satisfactory condition physically and which can be supplied with parts, should be regrouped to properly selected and prepared areas where they can still be used, in an organized way with increased central guidance. At the same time, the scrapping or transferring of machines and the management and use of materials deriving from scrapping must be regulated according to uniform principles and methods.

c. Type Composition (Homogeneity)

At the end of 1977, 77.8 percent of the machines working at budgetary organs were of socialist manufacture. This ratio was 61 percent in 1970. So the ratio of socialist products is increasing, if slowly. The ratio of capitalist machines decreased between 1970 (38.9 percent) and 1975 (13.7 percent) but again increased up to 1977 (22.2 percent), primarily because of the increase in the number of small category capitalist machines. The increase in the capitalist import of small machines derives from the fact that modern batch data preparation equipment, which is treated statistically as a small computer, could not be obtained on the socialist market.

In 1975, 22.0 percent of the socialist machine park was of the ESZR type; even in 1977, only 22.8 percent was. This ratio is substantially less favorable than in the enterprise sphere.

The organizational solutions tied to the developed machine type also make it difficult to switch from a capitalist machine to a socialist one.

Frequently they try to replace capitalist machines with another capitalist machine. We must reckon with this attempt even when the original investment proposal or idea calculated on a socialist machine.

The central and branch computer technology development programs--especially since 1975--have emphasized the priority of socialist types. The actual developments reflect this aspiration also.

The composition of the computer park according to product and product family is slowly improving although in this regard the situation is somewhat more favorable at the budgetary organs than nationally.

The computer technology development conceptions reckoned with the fact that in the initial period (up to about 1975) capitalist import would be unavoidable but it was the goal that this should derive from at most 2-3 Western firms. In contrast to this the 103 capitalist machines operating at the end of 1976 in budgetary institutions and in the few enterprise bases closely linked to the state administrative information system belonged to a total of 23 product families.

At the end of 1977 the 25 small computers of capitalist origin working at budgetary organs belonged to 9 product families and the 13 larger machines belonged to 5 product families.

The heterogeneous composition of the computer park makes service and parts supply difficult; data exchanged is possible only with extra work; and, last but not least, the development of machine systems, machine-machine links, etc. becomes more complicated.

In accordance with government resolutions pertaining to capitalist import, the acquisition of these machines was passed on within the framework of the SZTB one at a time, as a result of which machine imports were forced substantially beneath the level of needs. The primary determining factor in making these decisions was the requirement of capitalist technical-economic cooperation which took into consideration the interests of the national economy.

2. Operation of the Computers

The "calendar time base" for the 171 computers of budgetary organs is calculated on two-shift operation, 4,600 hours per year or a total of 787,000 machine hours annually. But 12 percent of these machines (20 of them) have not yet worked at all. Of these, 9 are not operational because they are in the process of installation while 11 were acquired more than one year ago but have not been put into operation because need determination and the creation of conditions for receiving them did not take place at a proper pace.

Much of the "calendar time base" is not used because of the low average number of shifts of operation (1.3 as compared to a national average of 1.8 shifts). Within this, the average number of shifts for small machines is 1.2; it is 1.8 shifts for the larger category.

Possibilities must be sought, primarily in education and research areas, for multi-purpose use of computers suitable for universal use. The reserves are illustrated by the fact that full two shift operation of the 171 machines of the budgetary organs would mean 107,000 machine hours or the output of 23 computers with the same size distribution.

An even work load for the shifts which are organized is not always guaranteed either. The time turned to maintenance and correction of technical problems is substantially greater than can be justified. Productive machine hours make up only 69.3 percent of the turned on machine hours. We will turn in the next section to the obstacles to capacity utilization of the machines.

a. Developmental and Operational Problems of Capacity Utilization

The installation of the first machines is frequently delayed because of technical preparation, etc. problems and even following this the new machines reach a higher shift number only after a rather long time (1-3 years). In general, for example, the machine systems belonging in the medium and large machine category which are operating in one shift are younger than 2 years. In the case of an existing machine base putting new machines into operation temporarily hurts average utilization of the existing machine park, even if not accompanied by a change of type.

The organization of more shifts is hindered by the general shortage of personnel, especially of data recording, operator and maintenance personnel, or by the unsatisfactory nature of data recording devices. In the interest of providing the personnel needed for multi-shift operation it would be justified to review the actual and the necessary personnel area by area and take measures to facilitate possible regrouping.

The operational reliability of the machines is reflected by the ratio of turned on machine hours to productive machine hours. There are few bases where operational reliability reaches 88-92 percent. Less than half the loss is maintenance time; the greater part is the result of technical breakdowns.

The development of technical down-time is influenced unfavorably by parts supply for some machines and by the postponement of repairs. This is interdependent with the age and type composition of the machines but it also suggests the general lack of organization and unsatisfactory nature of maintenance and parts supply. What lies behind such phenomena in the case of machines acquired from the capitalist relationship is often that existing service possibilities are not made use of, the services are not used. Where these problems have been solved the ratio of machine hours lost due to technical problems is hardly 4-5 percent.

So the domestic and foreign firms still lack linked service at an adequate level and providing this is hindered by the heterogeneous composition.

On the basis of the experiences of supervision there must be a significant improvement in maintenance activity so that the down-time due to technical problems will greatly decrease. Thus, measures must be taken:

--to improve parts supply, a foundation for which must be provided by collecting and processing operational experiences;

--to create organizations which will carry out tasks from giving advice, through installation, to maintenance (as a function of the composition of the machine park it would be justified to centralize stockpiles and experts --at the expense of local maintenance personnel); and

--to see to it that a large part of the maintenance work took place outside of scheduled work times.

The lack of software needed to improve the level of applications also causes no little problem. In the case of socialist types machines this is the result of poor software supply deriving from developmental deficiencies. But in the case of capitalist machines such problems are caused by machine selection which is not circumspect enough, they do not fit the task, or they do not buy the nesessary software. The hardware and especially the software development tasks deriving from the use of heterogeneous machine systems have become largely the tasks of the user or operator. A significant part of the research and development work connected with computer technology applications takes place in a decentralized manner--in the budgetary organs by making use of operating costs. The development and spread of standardized software elements has not developed at an adequate pace. We must seek organizational solutions and financing methods so that we can exploit the advantages of standardization.

In the interest of a qualitative improvement of software supply and development, in my opinion, we must define the basic types of tasks and chief trends of development, coordinated with the development of applications, must strengthen the organizational conditions for and prime contracting nature of software trade and should concentrate financial resources and the use of intellectual capacity.

b. Organizational Problems of Capacity Utilization

Computer technology is an indispensable tool for the development of national economic and branch information systems. If we examine a single area (institute or sub-system) by itself we can establish that the new technology has forced a better organization. But organizational problems appear at the level of branch and national economic systems. By the end of 1977, after 8-10 years development of the technical bases, a requirement developed

for working out uniform national economic and branch information systems. A concentrated and more effective utilization of computer technology requires a uniform information system development conception and coordination.

A very considerable part of the down-time of the computers, as compared to the calendar time base, comes about because of "lack of work." Lack of work appears in various waye and for various reasons, while in the same or other areas they repeatedly and widely refer to a lack of capacity.

A part of the "lack of work" is interdependent with the cyclic nature of data processing and education, which does lead to significant lost-time (for example, 80-90 percent of the 35-40 percent idle hours derives from this) but it also results in work peaks when 1-2 shifts must be provided with overtime and continual operation. But the more determinate group of causes producing the lack of work can be found in the interdependent areas of development and organization.

The sphere of users of some significant bases is narrower than is justified or possible. The branches (and the institutions) are striving to get their own computers because they expect from this swifter satisfaction of their unique and changing information needs.

The organization of branch systems suffers very considerable delays. The majority of them are only in the preparatory stage because the ideas are not supported by organizational experiences or machine possibilities; the ideas and the conditions have changed frequently; the quality of the work done already was not satisfactory and it has been evaluated in different ways.

Frequently the organizational solutions and the information and computer technology systems are prepared with different divisions, logical structure and definition of needs and contain only a small proportion of common, integrated elements. The practical steps thus far have hardly followed the theoretical ideas aimed at coordination and the initial attempts lagged completely

The branches base and organize their own systems on their own capacity. So the original ideas connected with development have hardly been realized. In only a few ministries are they dealing in an acceptable manner with a coordination of the activity of the computer technology bases of the several branches. Thus the branch bases, for the most part, work independently from one another and wihhout coordination (which means parallel operation at a low level of efficiency).

The idea arose, on the basis of the experiences of supervision, that there should be a further development of computer technology statistics. It should be possible to evaluate more systematically and in more detail the accounting and use of the computer technology tools of the budgetary organs, the computer technology processing done--with regard to the peculiarities of computer use by educational and research institutions too.

In addition, there should be greater implementation of what is contained in the pertinent Council of Ministers resolution, namely that "the chairman of the KSH, in cooperation with the chairman of the OT and the minister finance, should see to the coordination of the work of the computer technology systems of state administration, to the rational development of their activities and performance and to the effective utilization of their capacity."

At the same time it is necessary to accelarate the development and standardization of central and branch information systems, primarily the nomenclatures, data collection and conceptual systems, and the integration of data processing. The work in process must be harmonized from the viewpoint of organizational solutions and the existing or to be developed machine needs. Taking into consideration the systems and machine bases of the branches and the ANH:

--the tasks of the ASZSZ and the OTSZK should be modified in accordance with the changed circumstances;

--the computer technology tools of the ASZSZ should be given a more significant role in the solution of branch tasks; and in the interest of this:

--there should be greater oversight of the branch tasks to be carried out on computers--from the viewpoint of their justification and professional preparedness.

Using the existing computer technology bases in harmony with the branch information systems, greater care should be turned to the computerization of technical administration also.

Common foundations should be provided for the management system connected with the computer technology activity of budgetary organs and for the calculation of price incomes, jobwork and costs. The pertinent prescriptions must be implemented. In the interest of broader use of the computers of the budgetary organs in this sphere an interest must be created--through a differentiation of prices and payment obligations--so that these organs will not in general make use of enterprise capacity.

3. Computer Use in Education and Research

At the end of 1977 the institutions of higher learning and the budgetary research institutes had a total of 128 computers--not counting the minicomputers. This is 16-18 percent of the computer park of the country.

The demands being made of computer technology education in the institutions of higher learning--in harmony with their basic tasks--have increased significantly in the areas of education and research and in the area of information processing. The backwardness in regard to tools is of theoretical significance too when we consider that the existing computer park of our educational institutions cannot even adequately serve the spread of a domestic computer technology culture.

The reason for this--going beyond the age and type composition of the machines, their structure, etc.--is primarily that these computers are operated for at most 9.5 hours and 25-27 percent of these machine hours is turned to educational purposes. About 74 percent of this served scientific calculations, planning, etc.--and a significant but undefinable proportion of KK work. The proportion of educational use within the average shows a significant spread by institution, by season and even by machine.

Some phenomena point to the unsatisfactory nature of the educational organization solutions. The results which can be evaluated locally for individual areas cannot be generalized. The plan of the OM [Ministry of Education] aimed at the creation of four regional centers with a network extending to 25 institutions would make it possible--insofar as the achievements of the ESZR make it possible--to concentrate financial resources and improve education-centric utilization. But carrying out these tasks will require no little effort if we consider that the tools are now located in 22 institutions; significant completion and structural tasks must be financed and carried out.

Ideas have developed within individual institutions in regard to concentration and coordination also. But these are not in sufficient harmony with the ideas of the OM. The realizability of the program will require further analysis from the viewpoint of the different needs of the institutions and from the viewpoint of the technical conditions (for example, on-line links, remote data processing, etc.).

The budgetary research institutes have primarily small computers. Our backwardness in computer nets and in remote data processing is having a palpably disadvantageous effect in this area also. This is especially true of the large category machines necessary for scientific research (for example, large capacity storage, etc.). It is also a problem in the efficient use of the computers of the research equipment--and the need for personnel were not met.

The present situation is characterized by the fact that the complete absence (embargo) of large computers and of the high level computer nets based on these made much research impossible in the past period. Because of this the machine park of the MTA is slowly losing that advantage which it still had a decade ago and the practical realization of research projects is being done at the expense of processing of a basic research character.

For example, the ratio of scientific calculations actually shows a decreasing trend in all machine hours used by the MTA institutes in the capital while there has been an increase in that use which serves the putting into practice of scientific achievements (mathematical planning, operations research, project calculations, etc.).

The productive machine hours on the MTA computers average only 31.6 percent of the two shift "calendar time base" and the work done (for example, the

national instrument register, MTA personnel records, the scientific publications data bank, the agricultural history data banks) cannot be called primarily important, immediate areas of basic research.

On the basis of the experiences of supervision a possibility must be sought to increase the utilization of the computers, primarily small computers, working in the educational and research institutions so that the computers will be used--especially in the provinces--on the basis of common, integrated programs. And this, naturally, will require coordinated developmental plans. We must also see to it that at the institutions of higher learning:

--the theoretical and practical teaching of computer technology is in the study plan and the machines working there serve educational goals primarily and to a larger extent, and

--further developments are made more education-centric and more deliberate, strengthening the harmony of institutional and branch ideas.

The ratio of basic and applied research must be improved in the utilization of the computers of research institutes doing basic and applied research—at the expense of use for other purposes.

4. Computer Technology Developments in the Fifth 5-Year Plan

Independent of internal deviations the developments in the course of the Fifth 5-Year Plan are expected to be realized on a scale corresponding to the goals. The prescriptions basically defined the actual expenditures. But there are additional financial resources available for the development of computer technology, as for developments in other areas (other budgetary investment allotments, technical development funds, institutional development funds and other resources such as support for institutions of higher learning at the expense of enterprise developmental funds).

The development of each computer technology base usually draws on 4-5 different financial resources. The multiplicity of financial resources and the fact that funds from the same source often reach the user through multiple channels makes difficult the integration of developments, the concentration of financial resources, the centralization of assets and, last but not least, supervision of the preparation for and conduct of the developments.

On the basis of all this it would appear necessary to concentrate and coordinate to a greater degree the existing investment and R and D financial resources for computer technology development, and the use thereof, in order to better serve central ideas. It is thus justified:

--to strictly coordinate multiple channel financing in order to prevent the creation of capacity which does not fit central ideas or systems, and

--to concentrate financial resources primarily on stressed (central) areas and, subordinate thereto, on the development of branch bases, on the creation of networks and on software and applications development.

a. Definition of Goals

The restricted financial possibilities, as compared to the constantly increasing needs (which are not always well founded from the organizational side), have forced a justified and radical change in the previous development policy in only a few branches. The practice followed in planning investment prescriptions is often objectionable. Sometimes exessive investment proposals are formulated for the purpose of building up idealized configurations and sometimes they do not reckon with the building up of the entire configuration.

The majority of the installed new computer technology systems have considerably increased the number of new computer centers. In the course of the expansions the equipment was generally connected to existing bases, completeness and the development of the machine systems was improved. But in this respect contrary examples can be found also.

The basis for selecting computers should be a precise analysis of the organizational solution and applications goals of the system. But the definition of the size of the machines is often uncertain because the organizational solution is still missing or, at best, is half finished and the analysis, making it concrete, of the user tasks is not always reassuring.

When determining the size of the machines they have frequently started from work peaks or from long-range needs. This is generally justified and in principle it was correct. But the lack of integration between computer technology bases and the delays in systems organization can be attributed primarily to the fact that because of this superfluous capacity was created for a long time in some cases. It is sometimes unavoidable to create superfluous capacity--considering the magnitude and character of the tasks--but it would be justified to seek a way to use this surplus capacity in the budgetary sphere. By the time the user needs can be expected to surpass the machine possibilities a good part of the present machine park will have been scrapped or will be ready to be.

b. Realization

The limitations on construction possibilities and acquisition delays have played the primary role in the frequent postponement of investments. More than once, however, one could also observe an insufficiently circumspect preparation. In general the organizational programs prepared as part of preparation for the investments justify in detail the installation of the planned machines. In a number of investments, however, there were substantial deviations in the fulfillment of the obligations undertaken in the program.

Determining the configuration of the machines and the time of delivery and initial operation depend to a large degree on the possibilities of those delivering the machines too. The configurations can be expanded "in quantums" while the development of users tasks is usually continual. Thus a perfect balance between configurations and user tasks can be realized only temporarily, for a short time period. In general only organs with long operating experience can maintain the balance. In addition, when making acquisitions it is necessary to accomodate to the acquisitions quota prescriptions too.

In past years acquistion was frequently guided not by a well founded systems development plan but rather much more by short-range practice. The delays in manufacturing the large ESZR machines (the R-50 and R-60) often condemned the purchasers to making use of emergency solutions. Even today the machines have a greater influence on the organizational solutions than vice versa. This has an unfavorable effect on operation, on coordinating processing and, last but not least, in the practical contradictions between machine possibilities and processing needs.

In the first period of acquiring ESZR computers (1973-1974) a problem was caused by the lack of specially trained investment prime contracting organizations. These problems were gradually eliminated with the professional strengthening of the National Computer Technology Enterprise (OSZV), formed in 1973.

Experiences have been very mixed thus far in preparing to put the machines into use. In addition to a number of good examples there have been a good number of glaringly negative cases. In these cases the preparation was not complete and a good part of it fell in the run-in period following the arrival of the machine.

The several solutions are not only at different levels; in some places they result in excessive intellectual capacity and in other places they result in a lack of such capacity. There is not adequately developed contact even between those working on machines of the same type.

Creating receptive ability and preparation for operation depend to a large extent on the earlier computer technology experiences of the user organization. There have been attempts recently to make broader use of some standardized programs. The lack of preparation of the organization, of some leaders and of experts starting out in computer technology was characteristic of some of the first computer users.

The efficiency of investments in computer technology systems cannot be judged on the basis of the customary economic indexes. This is true not only because efficiency depends to a crucial degree on the need level and organization of the application but also because within the possibilities given by the provisions the different budgetary organs generate their price income in different ways at different levels, calculate their costs and show their achievements differently. It might be noted here that in many areas the

way is which costs are covered is unregulated in regard to machine use and operating new investments.

The age composition of the computer park of the budgetary organs is expected to develop in such a way that by the end of the Sixth 5-Year Plan 122 machines will be 10 years old. These will have to be scrapped or replaced and this can reasonably be expected to require the expenditure of 3.5 billion forints, including the sums needed for peripherals, other machines (air conditioning, etc.) and the justified construction.

5. A Few Conclusions

On the basis of the experiences of supervision summarized thus far it can be said that the use of computer technology has accelerated, its quality has improved, but it is not yet satisfactory in every respect. Coordination deficiencies are appearing in the development of information systems; the preparation of some organizations for use is not sufficiently well founded and circumspect. The supply of programs is not untroubled and in some cases problems are caused even by parts supply for the ESZR machines. The spread of remote data processing has not progressed to the degree counted on.

It must be emphasized that the utilization of computer technology can be ensured only with a much more determined concentration of material and intellectual resources, by a good bit more strict realization of central guidance and coordination. Together with this, in the interest of the efficiency of computer technology investments and of better use of the tools and with regard to the ability of the national economy to bear the burden, there is a need to tighten up the requirement system for developmental policy and practice and for accomodation to the new conditions. It would be justified if this would have an effect in the course of preparing and carrying out the Sixth 5-Year Plan.

On the basis of the experiences reported there is a need for the central and branch developmental conceptions to designate the chief areas of development more determinedly and more concretely, realizing more determinedly the requirements of selectivity, differentiation and integration. In the course of the developments the primary goal should be the liquidation of circumstances which hinder efficient use.

It can be set down as a definite opinion that in the future the development of capacity will take place primarily by completing, building up and supplementing; new computers will be installed and new bases created only in extraordinarily justified cases. In order to improve machine compatibility conditions only those tools should be acquired which satisfy attempts aimed at uniform organization, system and network development and decrease the organizational and maintenance (parts) problems deriving from incompatibility.

In addition, we must strengthen and accelerate that process which further increases, in the size composition of the computer park, the ratio of small machines or of large machine systems of the proper structure. It is necessary to acquire tools from the capitalist relationship only in extraordinarily justified cases. In the case of tools deriving from the socialist relationship (ESZR) greater attention than heretofore must be turned to quality acceptance, realization of the guarantee rights, a selection corresponding to the needs and the level of technical services.

It is justified to tighten up the requirements made of the computer technology investments of budgetary organs and the judgment of how well founded proposals for investments are. One could start from the position that the system for and the substantive requirements being made of the computer technology investments of the budgetary organs should be raised to the level of similar enterprise investments. In the first place, the selection of the machines and the preparation for their reception must be done in a more basic way. The activity of the appropriate central organs must be made more effective in the selection and acquisition of the machines.

There is also an interest in decreasing the time taken to carry out the investments, primarily in better preparation to receive the ESZR machines. It would be justified to strengthen the organizational conditions of the investments in order to accomplish this. The tasks of the OSZV should be extended and made more profound so that it can carry out complex prime contractor tasks, from preparation to the initiation of operation.

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NATION'S COMPUTER INDUSTRY: STATUS AND PROSPECTS

Warsaw INFORMATYKA in Polish No 1, Jan 80 pp 4-7

[Article by Zdzislaw Lapinski, MERA Association of the Automation and Measuring Instruments Industry, Warsaw: "The Nation's Computer Industry--Reality and Perspectives"]

[Text] The nation's computer industry, whose potential accounts for some 50 percent of the potential of the MERA Association, has during 1971-1978 supplied users with 585 computer systems and 2,130 minicomputer systems having an aggregate value of about 30 billion zlotys.

In undertaking the production of third-generation computers in 1973, Polish industry has preceded the other CEMA countries by a couple of years. During the "peak" year (1976) 105 computer systems were produced, including the R-32-21, the ODRA 1305-62, and the ODRA 1325-22. Two years later the output of the R-32 and minicomputer systems (400 units, including 186 for export) remained at the same level but the deliveries of the ODRA decreased more than in half.

In view of the increasingly greater requirements of users, pertaining chiefly to the reliability and optimal utilization of hardware and the use of real-time systems, early during the current 5-year period the implementation of a multifaceted program was commenced. This program comprises:

--Improvements in the quality and technology of the production and testing of computer hardware.

--Development of computer and software systems adapted to operate in the interactive mode and for remote data processing (the EC 8371 communication processor, developed by MERA-ELWRO, will represent an important export item as well as a basis for constructing remote data processing systems; the monitoring screens produced by MERA-ELZAB assure direct access to databases as well as their direct updating by production supervisors; currently the Center in Katowice is developing and introducing on the R-32 computer the SYMAG system, designed for real-time control of some 15 warehouses of the Katowice Steel Plant, located over an area of many kilometers).

--Development of new processors adapted for real-time operation and development or improvement of digital units linking computers to facilities.

--Implementation of computer hardware in many fields of application (chiefly within the framework of Key Problem 06.1: "Development and Application of Computerized Automation and Measurement Systems").

--Modernization of automation and measurement systems.

--Organizational changes (linking of automation and measurement plants with computer enterprises into scientific-production centers in Wroclaw, Warsaw, and Karowice).

Moreover, economic considerations and the existing principles of international cooperation, chiefly within the framework of CEMA, require the development of export production, chiefly of selected peripheral equipment and terminals produced in long series. Thus, e.g. the MERA-BLONIE Plant has gained--on the scale of CEMA--monopoly in producing line and character printers, as well as intelligent terminals and minicomputers of the MERA 100 and MERA 200 types. Modern technology has assured a high quality and low production cost, which served to, e.g. reduce the price of the character printer within 2 years, thus strengthening the position of the Polish producer on the international market.

In 1979 exports by the Association reached the value of 1 billion foreign-exchange zlotys (about 36 percent of total output) and by 1985 they can be realistically expected to reach 3 billion zlotys (about 55 percent of output).

Computerized automation and measurement systems produce the maximum socio-economic effect by increasing labor productivity. In reality, however, in many cases the situation in this country is different. The reasons for this situation are several. The most important of them are:

--Lack of organizational preparation in the economic or administrative units introducing the system.

The lack of formalized descriptions of the organizational structure of these units as well as of the planning and decision-making processes occurring in the individual departments often leads to improper reorganization decisions which mostly result in greater chaos and disorder. The computerization of such structures and processes of course misses its aim. On the other hand, the complexity, number, and dynamics of the tasks of economic and administrative units are such that their effective management without computers is becoming impossible.

--Incompleteness or lack of replicable applied programs adapted to the typical needs of the economic or administrative unit.

The user expects these programs from the hardware producer. Yet the labor requirement of the development of such programs is some 15 times as high as the labor requirement of the production of hardware and of the development of basic programs which, as is known, unlike applied programs are an integral part of the computer hardware supplied. Moreover, the labor requirement of the development of software at an industrial enterprise is counted among direct production costs rather than among indirect costs.

As a result, programmers working in industry are included in the limited-employment group. This has caused the employment of programmers at the MERA Association to remain at the 1976 level.

Example: The MERA-SYSTEM Enterprise, established in 1975 for the development of special-purpose software and the planning of organizational changes, can during the 1976-1980 period render such services only in the amount of 250 million zlotys, owing to the above-mentioned restrictions on employment. This accounts for barely 0.2 percent of the Association's output and less than 1 percent of the value of the installed hardware: in comparison hardware accounts for only 8-15 percent of the total cost of a comprehensive computerized information system. It should be noted that within the MERA, independently of the other domestic organizations developing application software, a quantitative and qualitative expansion of the organizations developing application software and organizational projects for various user groups is needed, independently of other organizations in this country. Moreover, the production cost of software should be as soon as possible declared to be a completely autonomous component of the direct production cost of computers. It is pertinent to note that a sufficient number of programmers are working in this country. They are, however, scattered among various organizations whose activities are unfortunately uncoordinated, thus aggravating the difficulties associated with the acceleration of the rate of development of application software and of standardization of organizational solutions and their introduction on a nationwide scale.

--Incompleteness of hardware and standard software. As a rule, computers are purchased without the necessary input/output devices. The user often does not know which of the programs contained in the standard software package are indispensable and which are indispensable so far as he is concerned. Sometimes, too, the purchasers lack the funds to acquire a complete system and deliberately buy first of all the computer--i.e., the cheapest but also the most spectacular part, which at least provides an appearance of automation of the enterprise. As for the MERA, although it produces a large variety of peripherals, it cannot always supply them in the desired quantity on the desired date owing to the existing restrictions and limitations on the so-called investment production in which--very mistakenly, besides--the equipment produced by the Association has been classified. To illustrate: the satisfaction of the needs of all domestic users and their provision with equipment for interfacing facilities with computers, as well as with peripherals and terminals, and also the expansion of central units, would have required increasing output by 3 billion zlotys in 1979!

--Lack of a sufficiently developed computer hardware maintenance service.

It is necessary to expand the service to at least the extent envisaged in the resolution of 26 July 1977 of the Politburo on allocating for this purpose during the current 5-year period about 2 billion zlotys. Unfortunately, so far even the ultimately allocated amount of 1 billion zlotys has not been utilized.

For reasons given above, the installed computer hardware (having an aggregate value of about 40 billion zlotys) is often insufficiently or ineffectively used. Even if we consider that part of the hardware (having a value of 10 billion zlotys) is obsolete from the standpoint of technology and design, the remainder (30 billion zlotys) points to the existence of an unexploited multibillion economic potential. To exploit this potential, attention should be primarily focused on:

1. Appropriate organizational preparation of the computerization of economic and administrative units.

2. Development of standard application programs for specific fields and user groups.

3. Complementation of hardware and software configurations operated by users.

4. Expansion of the maintenance service base at the MERA Association.

The development of the nation's production of computers and computerized automation and measurement systems during 1980-1990 will hinge on the further growth of industrial output on the national scale (annual growth rate of the order of 6-8 percent) and decrease in employment (the net influx of labor force on the national scale will diminish from about 350,000 in 1980 to about 90,000 in 1985).

As shown by the experience of the highly developed countries, computerized plant automation and measurement systems represent the source of the greatest economic advantages, assuring a dynamic increase in output along with a marked decrease in employment. Thus, comprehensive research should be undertaken into the development of specialized automatic production control and management systems in industrial subbranches and production facilities. Standard models for the management of enterprises depending on the size, nature of production, and the technology employed at the enterprise should also be developed. In addition to models of automation for the hitherto preferred large organizations, attention should be paid to models of automation for small organizational units, and particularly for small enterprises, because these account for most of the nation's employment and harbor the greatest potential for automation.

Another direction of the automation of management during the years 1980-1990 is the construction of a national computerized state management system through the development of the already existing governmental and ministerial computer centers in the direction of data transmission in the interactive mode. During 1981-1985 a comprehensive model for feedback between the citizens and the administration should also be developed, so that during 1986-1990 appropriate pilot systems could be constructed and, after 1990, introduced into common use.

During 1980-1985 it is intended to achieve the replacement of human labor with indirect labor through the expansion of production and application of data processing systems in, chiefly, the following 3 domains of automation:

--Office work and banking operations.

Here a 5- to 7-fold increase in labor productivity is feasible. Studies have shown that about 40 percent of office work can be entirely formalized, and 25-30 percent can be automated. As a result, during the 1980-1990 period, employment in our banks can be reduced despite a 3- to 4-fold increase in the number of operations.

--Technological process and machinery control.

The introduction of microprocessor structures during 1980-1990 will reduce in half or by two-thirds the cost of the automation and technological processes of individual machines.

Robots will represent another vital factor in the automation of machinery and flowlines. In 1979 the MERA Association has started the production of special-purpose robots of the PR-02 type, and this year the production of IRb all-purpose microcomputer-controlled robots will be commenced. MERA's robots can entirely automate installation operations as well as welding, lacquering, storage, galvanic, and other operations.

--Production management and control.

In this domain of automation the fundamental question is a proper organizational preparation assuring an optimal utilization of the installed hardware.

Development Trends of Computer Hardware Production During 1980-1985

The premises for expanding the production of computer hardware and its scale by the MERA Association during the coming 5-year period are chiefly based on:

1. Needs of domestic users and the size of funds allocated for the production of computer hardware.

2. Needs of exports and the specialization of production as part of the international division of labor on the scale of the CEMA.

3. Possibilities for utilizing large-scale integrated circuits.

It is assumed that ready access to large-scale integrated circuitry (LSIC) will be common as of 1981, and especially access to microprocessors and RAM, ROM, and PROM type semiconductor memories, as produced domestically and by other CEMA countries. The introduction of LSIC systems into the hardware produced by the MERA Association will markedly influence the new computer hardware solutions, assuring a 15-20 percent improvement in the quality and reliability of that hardware, and hence also a marked prolongation of fa' ure free systems operating time. The operating speeds and capacities of computers and minicomputers will increase, special-purpose operating memory control systems will find broad application, and operating systems will be more independent of system configuration. The miniaturization of mini- and microperipheral hardware will assure universality of the use of micro- and minicomputers, which will be made available to private individuals as well: this will revolutionize our lives more than the first-, second-, and third-generation computers and minicomputers have done.

It is worth noting in this connection that the MERA Association has as early as in 1976 commenced the implementation of microprocessors for computerized automation and measurement systems. New solutions based on microprocessor technology have been developed. In 1979 the Association's industrial production included many products (e.g. MERA 50 and MERA 200 microcomputers, the INTELSTER PC flowline controller, IRb type robots, the CNCNUCON-400 machine tool control system, the MERA 7900 monitoring screens, the PSDP-45 data setup station) incorporating such microprocessors as the INTEL 8008, the INTEL 8080, the INTEL 8085, and the INTEL 3000. Within the next few years other products based on microprocessor technology will begin to be manufactured.

The possibilities for supplying domestic users with MERA-produced computer hardware incorporating microprocessor technology are unfortunately limited. This is because all LSIC subassemblies have to be imported from X the "Second Area" [capitalist countries] and hence, in order to earn the wherewithal to pay for the needed imports of these subassemblies, the MERA must export the hardware to the countries of the Second Area. This is to the disadvantage of domestic users, and the situation will change radically to the better only when the industrial production of LSIC will be commenced in this country and in other socialist countries.

For the time being, operating in the specialization assigned to it, the MERA Association has markedly expanded its production of peripherals and terminals, but unfortunately 80-90 percent of that output is destined for export. For the 1980-1985 period a further drastic expansion in that output--also along with reserving most of it for export--is envisaged. In this connection, in 1985, as in 1979, 80 percent of our exports will

consist of exports of peripherals, terminals, micro- and minicomputers, computers, and computerized automation and measurement systems.

During the 1981-1985 period, contracts for deliveries of computerized automation and measurement systems designed for specific technologies will be concluded within the framework of the JS EMC [Uniform System of Electronic Digital Computers]. Domestic users could order such systems together with equipment for linking working posts (technological facilities or machiner) to the computer.

A couple of years later still and, on the one hand, any further increase in the output of the nation's industry will become impossible without automation while, on the other, the installed computer hardware will produce financially measurable socioeconomic effects. Unless these effects are on hand, the decisions and resources for developing the production of computers and computerized automation and measurement systems for the needs of domestic users will not be made and allocated.

To enable domestic users to complement the facilities already on hand, the ceiling on the production of computer hardware at the MERA Association should be raised during 1980-1982 by an additional 3-5 billion zlotys. The allocations obtained by domestic users for expanding or complementing their computer facilities are much greater than the allocations for that production at the MERA Association. In effect, the Association, which produces hardware needed by domestic users to expand or complement their configurations cannot supply them with that hardware in the quantities needed by the users and for which they have been allocated adequate acquisition funds. It is worth stressing that the MERA Association already has a potential production capacity adequate to satisfy all the needs declared by the domestic users.

The experience gained by the general suppliers of computer hardware shows that the needs of most users reduce most often to the input, storage, and processing of data flowing at an average rate. In such cases the basic configuration of the EC 1032 computers currently delivered, which the users receive together with operational systems allowing for remote access functions, proves to be adquate.

In 1980 twin EC 1032 computer configuration with an aggregate operational memory capacity of 2M bytes each and enhanced reliability, linked to minicomputers and remote terminals, will also be available. They will assure a solution of the problems of the control and management of production at large continuously operating facilities of the Katowice Steel Plant type.

All users to whom it is more convenient to use ready-made utility program batches for IBM 370 computers, in virtual-memory operating systems, than to process them on EC 1032 computers, will be interested to know that as of 1981 second-generation EC 1045 Uniform System computers will be available to them. These computers are, as is known, counterparts of the IBM 370 computers.

The ODRA 1305 digital computers also are worth mentioning. These computers have passed satisfactorily their trials in numerous computer centers, and particularly in electronic computer computation plants of the Information Science Association. Hence, they can and should continue to be used within the framework of the available software and known applications. However, the existing ODRA 1305 configurations have to be equipped with additional disc memories. These needs were taken into account by the MERA Association in its plans for the next few years. The production of the ODRA 1300 series computers will be terminated in 1980.

Data Setup and Input Systems

The MERA 9150 (EC 9150) multi-position system for the collection and setup of data stored on magnetic tape, adapted to JS EMC and ODRA 1305 computers, has been supplied to domestic users since 1978 in limited quantities ([owing to] restrictions on [CEMA] cooperation imports). As of 1981 this system will be widely available.

Its basic configuration includes 8 data input posts and a main computer with two tape memories. The maximum configuration of the MERA 9150 includes 16 data setup posts equipped with screen displays and keyboards, as well as a main computer with disc memories and a maximum of 4 tape memory units. The systems software assures the implementation of the functions of data retrieval, input data verification, and data setup.

Single-position floppy-disc data setup stations MERA-PSPD 90 will be widely available as of 1981. For the present they are supplied in limited quantities to domestic users.

A MERA-PSPD 90 station assures data recording in accordance with the standards of the Uniform System of Electronic Digital Computers [JS EMC], the Small EMC System, and the MERA 400 and the MERA 300. The functions of the recording and verification of the input data are programmed at the microinstruction level.

Peripherals

Peripheral equipment represents the field specialized in by Poland under the international division of labor within the framework of the JS EMC. The following domestically produced peripherals are currently available:

--Input-output devices--the EC 7076 (DZM 180/32) technical monitor, the EC 6122 (CT-2000) punch tape reader with a readout rate of from 150 to 2000 rows per second, the CDT 325 paper tape reader-puncher, the EC 7033 (DW-3) line printer, and the EC 7186 (DZM-180) mosaic printer.

--External storage units--the EC 5019 (PT-3M) tape memory with the NRZ-1 pulse recording (recording densities: 32 and 8 bits/mm); the EC 5002 (PT-5)

rapid tape memory with PE phase modulation and a recording rate of up to 64 bits/mm.

--Terminals--the EC 8575 (DZM-180/57) interactive terminal, the DZM-180/KSR interactive terminal, the EC 7952 (MERA 7152) local monitoring screen with keyboard, a local monitoring screen module (MERA 7902 control unit plus 8 MERA 7910 monitoring screens), the MERA 7950 autonomous remote monitoring screen with keyboard, a nonautonomous remote monitoring screen module (MERA 7901 control unit plus 8 MERA 7190 monitoring screens), the EC 8575 remote interactive terminal.

A complete satisfaction of domestic demand would require undertaking the production of more than 100 types of peripherals, but the nation's industry will produce only about 30 types. Under preparation [is the production of the] following peripherals: an alphanumeric monitoring screen assuring display of graphics, a graphics console with precision imaging and light pen, and intelligent terminals with a high operating efficiency (developed on the basis of mini- and microcomputers) with specialized peripheral hardware and standard facility interfaces (the interfaces INTELDIGIT P, CAMAC, IEEE-480, SMA-M).

As for the other peripherals, not produced by the nation's industry, they are and will continue to be imported from the other CEMA countries. The principal peripherals currently thus imported include: the EC 5061 disk memory, the EC 6061 card reader, and the EC 7014 card puncher.

In the subsequent years large-capacity (100 MB and up) disk memories, drafting board rigs adapted for autonomous or direct operation within the configurations of the EC 1032 computer, and other hardware will become available.

As regards the so-called third peripherals, the nation's industry has commenced in 1979 the production of basic types of hardware such as tape and band cabinets, paper feeders, etc. At the same time, imports of this equipment from the CEMA countries will be continued and increased, but the demand will be completely satisfied only after several years.

Mini- and Microcomputer Systems

The MERA 300 system, supplied to users in various configurations (including those with disk memories), has been chiefly designed for the following applications:

--Computational operations in small- and medium-sized organizational units.

--Direct conversions of statistical-report nature.

--Interfacing with measuring and laboratory apparatus.

--Technological and diagnostic tests.

Minicomputers of the MERA 300 system have fulfilled their purpose in their numerous applications. In view of their technical level, however, they belong among the equipment whose production is being or was discontinued, and the year 1979 was the last year of their production.

Instead, the pertinent needs of the users will be satisfied with:

--MERA 400 minicomputers--as regards more complex calculations and data processing, they require larger memories, fast operating speeds, expanded configurations of monitoring screens, and data transmission to remote terminals.

--MERA 100 and MERA 200 microcomputers--as regards office calculations, statistical work, reports, and planning studies; they will also be used as autonomous and intelligent terminals in larger word-processing systems based on the MERA 400 minicomputer.

--New microcomputers based on microprocessor techniques (counterparts of DEC LSI 11, INTEL SBC 80)--for use in automated measurement and laboratory systems, as well as in the capacity of microprogrammed technical and technological equipment controllers and technological process controllers.

The MERA 400 system is a completely modular system and in 1979 it already began to be supplied in maximal and basic configurations.

The maxmimal configuration is a 2-computer configuration and consists of: 2 processors with memories of 64, 16-bit K-words each and with optional hardware floating point; 2 disk memory (MERA 9425) units of 7.5 MB each, or 2 EC-5061 disk-memory units of 30 MB each; a local or remote monitoring screen cluster; a DIGIGRAF type automatic drafting board rig; the possibility of synchronous and asynchronous data transmission by telephone and telex lines (can be with communication protocols according to IBM standards); 2-4 tape-memory units; 2-4 standard input/output units and terminals of the DZM 180/KSR and MERA 100 or MERA 200 type. As of last year, the maximum configuration of the MERA 400 comprises, moreover, additional input/output service modules, including modules for 2-computer operation and for interfacing with the EC 1032, as well as--upon request by user--the SOM-5 operating system adapted to the interactive mode (local and remote).

Most of the demand pertains to the basic configuration which, as of 1978, comprises: a processor with a 32 K-word memory and an optional hardware floating point, 1 disk-memory unit with 7.5 MB capacity, 2 input/output devices of the DZM 180/KSR type or a MERA 7952 monitoring screen, standard V24 communication interfaces, and standard peripherals. As of 1979 this configuration is complemented with a real-time SOM-3 operating system, FORTRAN IV and BASIC language translators, and a routine library (more than 60 routines). As of last year, too, the users of basic configurations

will also be provided with--on the basis of individual orders--batches of application programs for information retrieval, optimization of mechanical and construction designs, technical preparation of production, economic management of an enterprise or association, and the like.

The maximum configuration of the MERA 400 assures the solution of the following problems:

1. Complex scientific and technical calculations, along with simulation and optimization of solutions in the interactive mode with provision of remote access to large databases installed in EC 1032 computers.

2. Control of continuous and discrete production processes at the production-department level in hierarchic systems--with direct technological process control by microcomputers.

3. Computer-assisted designing of facilities and mechanical and electronic systems--autonomously or on interfacing with the EC 1032 computer.

4. Services to medical clinics and hospital departments as well as to larger analytic and diagnostic laboratories.

The basic configuration of the MERA 400 assures the solution of the following problems:

1. Varied engineering, scientific-technical, and statistical calculations.

2. Automation of certain production, monitoring, and central recording processes on utilizing channels for interfacing with the facility in terms of INTELDIGIT P1 and CAMAC standards.

3. Automation of physical and biological research experiments as well as of laboratory measurements on the basis of IEC standards.

4. Autonomous processing of data for purposes of management and office work in medium-sized organizational units.

This year translators of COBOL and SIMUL 67 will be offered for sale, and in 1981 the SOM-7 operating system, adapted for simultaneous processing on the basis of the LOGLAN parallel-type programming language (an original language being developed in collaboration with the Warsaw University) will be available.

As part of the collaboration between the nation's computer industry and the industries of the CEMA countries, during 1981-1982 second-generation minicomputers of the Small EMC System will be offered for sale to domestic users and for export. They will be represented by the SM 52 type modular minicomputer, whose scope of applications will match the scope of applications specified for the configurations of the MERA 400.

During the 1983-1984 period further development of SM 51 minicomputers is expected in a direction coinciding with the predicted development trends of the leading world companies and the results of Polish scientific research.

The SM-3 minicomputer, which is a result of collaboration between the Polish industry and the Soviet minicomputer industry, belongs among the first-generation computers of the Small EMC System. Considering that the range of applications of the SM-3 computers by domestic users matches in principle the range of applications of MERA 300 minicomputers and MERA 100 and MERA 200 minicomputers, broader introduction of this minicomputer on the domestic market is not expected, particularly since the users are able to import the expanded SM-2 minicomputer, suitable for purposes of control and efficient management.

Equipment for Mini- and Microcomputer Systems

Mini- and microcomputer systems are currently equipped with the following Polish-produced input/output devices: CT-2000 (SM 5407) paper tape reader, DT-105 (SM 6222) paper tape puncher, SPTP-3 (SM 6204) paper tape setup station, MERA 7952 (SM 7209) monitoring screen, DZM-180 (SM 6302) mosaic printer, DZM 180/KSR interactive terminal, PK-1 cassette tape memory, PLX 450 (SM 5602) floppy disk memory, keyboards of various types, and asynchronous and synchronous transmission control units. These systems are equipped with MERA 9425 (SM 5401) disk memories and PT-305 tape memories. The MERA 400 minicomputers are moreover provided with monitoring screen clusters along with the MERA 7905 control unit, whose performance potential is identical with that of the IBM 3270 system.

In 1979 the production of x-y writers with the V24 interface was commenced; these writers assure standard connection with mini- and microcomputers.

Since 1978 the nation's industry has been supplying minicomputer system users with facility-interfacing hardware such as ensembles of INTELDIGIT P1 channel modules, and since 1979, CAMAC ensembles.

During the 1980-1981 period the aforementioned Polish-produced devices will become available, among others, graphics monitoring screens and communication interfaces assuring network operation of minicomputers and microcomputers.

Additional peripheral equipment for mini- and microcomputer systems will be provided through imports from the socialist countries (cassette disk memories, computer graphics devices). Developmental work is geared to complete standardization of the miniperipherals in accordance with the provisions of the Uniform System.

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COMPUTER PRODUCTION, APPLICATION DESCRIBED

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[Article by Zbigniew J. Salamon, Center for Computerized Automation and Measurement Systems MERA-ELWRO, Wroclaw: "20 Years of MERA-ELWRO"]

[Text] The Fourth National Conference of Producers and Users of Computer Systems coincided with the jubilee 20th anniverary of the Wroclaw MERA-ELWRO Center for Computerized Automation and Measurement Systems--the factory in which the industrial production of digital computers had commenced in Poland. We are speaking of industrial production, since the first experimental digital computers in Poland had been developed and built as early as in 1958 at the Mathematical Apparatus Plant of the Polish Academy of Sciences....

Production Quality

During the 1974-1978 period marked advances took place as regards the quality of computer hardware and systems. The ELWRO has introduced many solutions of basic importance to increasing the reliability of hardware. The principal solutions include:

1. Use of computerized methods for the design and preparation of printed circuit boards along with simultaneous synchronized taping of the program for circuit drilling control.

2. Total modernization of the production of printed circuits at the Bierutowo branch.

3. Application of the aging of all semiconductor elements and of their 100-percent quality control before and after aging.

4. Application of 100-percent quality control of operating memory plates and of the finished memory modules, along with their aging at low and high temperatures.

5. Use of semiautomatic machines for the wiring of elements by the winding method, with computerized address selection.

6. Use of a computerized tester for 100-percent monitoring of wiring quality.

7. Use of a semiautomatic line for soldering and cleaning of element packets.

8. Application of automated equipment for cutting and insulating of wiring as well as for straightening and clamping the ends of passive elements.

9. Development and production of redesigned R-32 permanent memory.

10. Construction and equipping of a special room and the introduction of trial operation of complete computer packages in configurations ordered by users.

11. Organization and opening of a central air-conditioned laboratory equipped with chambers containing all hardware, inclusive of central computers.

12. Renovation of chemical laboratory.

13. Introduction of the principle of the simultaneous production of both a product and the spare parts for it, which has solved in practice the spare parts problem for the equipment produced by ELWRO. (Upon the decision of the Chief Director of the MERA Association this principle has been introduced this year in every enterprise of the MERA.)

14. Marked expansion of maintenance service through increase in its facilities (acquisition of special-purpose tools, production of maintenance tool chests, and acquisition of motor vehicles), hiring of additional experts, and organization of reliability service.

15. Application of the principle of designing for reliability in the technical design (blueprint) stage and organization of a reliability service.

16. Introduction of the principle of defining reliability requirements for components.

17. Use of a special self-loading and unloading truck for hardware transport.

This has resulted in achieving:

1. Incomparably greater reliability and availability of systems.

2. Marked reduction in the time of activation of the central computer and of the entire hardware package at the user's facility.

3. Marked reduction in the number of unused computers compared with the number of computers produced.

These achievements are illustrated by Table 1.

Table 1

Criterion	1975	1979
Mean failure-free operating time of R-32 microprocessor (hours)	40	140
Mean activation time of central computer (weeks)	6	3
Mean activation time of system at the user's facility (weeks)	9	2
Ratio of the number of computers produced to the number of computers not released for use	143* / 90	575** / 45

* As of 30 Sep 74
**As of 31 Oct 79

Production of Computer Hardware and Its Efficient Utilization

The 1974 Decision of the Government Presidium assumed that 600 medium-size computers (the ODRAs and R-32) will be produced during the 1976-1980 period. Of that number, 300 computers were to be exported and the other 300 were to find application in the nation's economy in the following fields: production management (190), technological process control (70), automation of engineering work (40). In reality, however, computer exports have been much smaller.

The pilot application of computers for purposes of technological process control and automation of engineering work has not yet produced sufficient results. As a result, the number of computers produced has decreased. Table 2 presents a balance sheet of third-generation computers.

Table 2

	1976	1977	1978	1979*	1980**
Computers produced:	105	70	60	50	35
Exported	6	7	5	7	4
Imported	10	7	6	4	5
Transmitted to domestic users	109	77	61	47	36

* Anticipated fulfillment
** Draft plan

In 1976 production was divided into three principal groups:

--for exports;
--for the domestic market;
--for the nation's investment-supply needs.

Table 3

Size of Output (in millions of zlotys) for Each Group	1976	1977	1978	1979*	1980**
Production for export	394.0	572.0	1015.3	1304.0	1600.0
Production for domestic market	84.0	221.0	407.8	720.0	850.0
For the nation's investment-supply needs	2238.0	1042.0	1642.0	1720.0	1500.0

*Anticipated Fulfillment
**Draft plan

For each group the size of output was determined so as to give preference to the first two groups and to limit the third group. Table 3 illustrates the changes in the size of output of each group.

Both at our enterprise and at the other plants of the MERA recently special emphasis has been placed on increasing output for export and for the domestic market. Of course, only products in demand abroad can be exported. A direct consequence of this situation is the current temporary shortage of computer hardware on the domestic market. We understand the complaints and claims of the domestic users, since there is a shortage of operating memories, printers, monitoring screens, etc. We are expanding our production capacity and as of 1980 we shall gradually reduce the backlog.

This situation has its advantages as well. First, by stimulating exports, it forces modernization of production and improvements in its quality, which can only be to the advantage of the domestic user. Second, it necessitates taking steps to increase the effectiveness of the applications of computers in the economy, until a state is achieved in which the demand for computers will be ranked as important in the nation's economy as the demand for mining combines, automatic machine tools, etc. This state will represent the beginning of a new stage in the development of the production and applications of digital computers.

In my opinion, the increase in the effectiveness of the applications of digital computers in the economy can be achieved by: 1) increasing the reliability of equipment; 2) providing functionally new equipment enhancing the potential of the already installed computer hardware; 3) increasing the deliveries of peripherals and application software; 4) assuring, above all, the spread of computers from glass-and-aluminum buildings to working posts: in production departments, warehouses, at bank windows, in clothing plants, and for various technological process control purposes.

I have already discussed the measures needed to enhance reliability. Work on other solutions in this field is continuing. As for point 2), certain steps already have been taken. Current deliveries include:

--equipment assuring remote access to ODRA computers along with printer and display terminals;

--disk memories for the ODRA (small-capacity, for the time being);

--this year the first communication processors for Uniform System computers will appear, along with local and remote printer and display terminals (of necessity, priority will be given to exports).

In addition, work is continuing on the development of control units assuring the application of larger-capacity disk memories to ODRA computers as well as of new terminals assuring the application of computers to the control of the flow of production and materials and the automation of banking and engineering operations.

As regards the increase in the deliveries of peripherals, the changes in this respect are best illustrated by Table 4.

It is worth noting that, upon a proposal by our Center, during the years 1978 and 1979 the output of central units was reduced in order to produce more peripherals within the limits of the allocated ceiling.

Table 4

Year	Number of Units Central Units	Peripherals
1976	105	1100
1977	70	1979
1978	60	2322
1979*	50	2473
1980**	35	2400

* Anticipated fulfillment
** Draft plan

We also organized a central routine library by means of which we distribute programs developed by users. We value very highly the products they develop. This year, on the initiative of the Ministry of Machine Industry, a software fair has even been organized in Katowice.

There is no doubt that the greatest problem is to adapt digital computers to the automation of specific operations, which is so needed given the growing shortage of labor, materials, and energy.

Expectations

The Conference proceeds at a time which represents, as it were, a summation of broad discussion of the development of information industry in Poland. On the one hand, the discussion reveals that the hopes for the widespread use of computers in the economy have been realized, and on the other, it strengthens our conviction that the use of computers is a necessity. Computers offer a chance for alleviating the existing limitations--the shortages of materials, energy and manpower. They assure a more complete fulfillment of the stipulated economic goals. The achievement of positive results in their application will place in a more favorable situation the entire community of those associated with the development, production, and application of digital computers as well as with cadre training. The principal developmental trends for the next few years, as envisaged by the MERA-ELWRO Center, and as associated with the development of the subbranches, remain closely tied to the fundamental economic aims.

We plan to introduce pilot systems in the following fields:

--Production flow control at MERA-ELWRO and POLAR-WROCLAW as well as collaboration in the expansion of the first stage of such a system existing at the Warsaw FSC [truck factory].

--Technological process control of paper production (SWIECIE Combine).

--Automation of the monitoring of electric power meters (MERA-PAFAL).

--Automation of banking operations, with marked participation by the NBP [National Bank of Poland].

--Automation of engineering work and of mass medical tests.

The implementation of the above pilot solutions is extremely difficult. It requires the development and introduction of the production of new types of equipment, knowledge of the technologies to be automated, and the development of application software. To this end, the following will be introduced into production during the years 1980-1983: a data transmission processor, control units, bank terminals, production flow control terminals, concentrators and graphics displays with light pens. The devices mentioned above will, together with the equipment already manufactured by the MERA Association, assure the provision of complete computer system packages for the automation of operations in various fields. Of course, the development, complementation, and introduction of systems will be in the future handled by many of the MERA Association's centers as well as by other most interested branches and industries. There is no doubt that the situation is not easy and that some time will pass before the community of computer scientists will be able to take pride in introducing applications that win general recognition. Yet precisely this situation and these goals should prompt us to united action rather than divide us. We can win respect for ourselves and gain satisfaction from the cause which we serve only if we all follow a single goal and rid ourselves of outdated notions.

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DEVELOPMENT OF COMPUTER HARDWARE OUTLINED

Warsaw INFORMATYKA in Polish No 1, Jan 80 pp 17-18

[Article by Bronislaw Piwowar, Wroclaw, MERA-ELWRO Institute of Computerized Automation and Measurement Systems: "Development of Computer Hardware at MERA-ELWRO"]

[Text] Since the production of computers was first undertaken by WZE [Wroclaw Electronics Plant] ELWRO, changes have taken place in the design and technology of production of that equipment--electron tubes have been supplanted by medium-scale integrated circuits; series-connected logic arrays, by parallel arrays; single-program computers, by multi-program computers; input systems, by multi-access and multicomputer systems. During the same period the operating speed of computers has increased by a factor of more than 6,000, and the cost of the implementation of 1 million addition operations has decreased from 500 zlotys to 0.0028 zlotys, i.e. by a factor of 170,000.

The proportional structure of the basic components of computer configuration has changed markedly, particularly in terms of value. The first digital computers consisted chiefly of a central unit (about 94 percent of the value of the package) and elementary peripherals (teleprinter, reader, and paper tape puncher). At present the number and complexity of the peripherals of an average computer system have grown so much that often they account for more than 80 percent of the value of the entire configuration, despite the parallel tremendous expansion of the equipment of the computer itself.

In the 1970's third-generation computers were developed and introduced into production: the ODRA 1325, the ODRA 1305, and the first Polish computer of the Uniform System: the EC-1032. The principal design feature of these computers is the modular nature of the hardware and software, which assures the development of numerous utility configurations satisfying differing needs and requirements of users.

Nowadays computers of the ODRA 1300 series represent the principal hardware on which is based the nation's program for the development of

information science. By the end of 1980, when the production of computers in this series will be terminated, about 500 ODRA 1304, 1325, and 1305 computers will operate in this country and abroad.

The principal advantage of the ODRA 1300 series is the attendant extensive verified basic software and application software pertaining to the most varied fields of management and planning, the automation of design work and scientific and technical calculations, and production and process control. Beginning with 1981, the existing configurations will be further developed through an increase in the capacity of the operating memory, the provision of disk memories with a capacity of 30 M bytes as well as of teleprocessing equipment, and the development of multicomputer systems. As the production of hardware for the ODRA 1300 series diminishes, the production of hardware within the framework of the Uniform System of Electronic Digital Computers ("JS EMC") will increase.

As is known, the JS EMC consists of numerous computers with differing computational capacities but with an identical logic architecture, as well as of a sophisticated variety of peripherals. Owing to the uniform operating principles of JS EMC computers, it is possible to interface software among different computers in this system as well as to equip them with the same peripherals. This assures achieving the benefits ensuing from the international division of labor [within the CEMA], chiefly in the development and production of discrete hardware and software modules. JS EMC computers belong in the general-purpose class and can satisfy needs for data processing in many branches of the economy. The production of these computers is based on the latest achievements of the socialist countries with respect to the base of elements, the assembling techniques, and methods for the development, production and operation of means of computer technology. The EC-1032 computer developed and produced by the MERA-ELWRO Center belongs in the modernized series of first-generation computers of the Uniform System (RIAD 1).

The EC-2032 central computer and the EC-8371 teledataprocessor incorporate up-to-date design and technological solutions, that is, medium-scale integrated circuits, multi-layer printed-circuit boards, planar operating memories, wiring by the winding method as well as with the aid of flat cables. In the pertinent production technologies great emphasis has been placed on attaining the highest possible level of reliability. To this end, priority has been given to introducing the shock-treatment, aging, and selection of electronic elements.

All the active elements undergo aging at high temperatures and in humid premises, followed by random quality control only in the case of elements displaying a low degree of defects and a high stability of parameters. In the course of activation and subsequent quality control, the resistance of packets to vibrations and impacts is tested. The units and modules additionally undergo shock-treatment or aging (e.g. operating memory units are shock-treated for 4, 2-hour cycles at temperatures of from -10°C to +55°C.

During the activation stage the central computers and the teledataprocessors undergo 3-day high-temperature aging and, as the final part of the acceptance test, a continuous 24-hour operating trial. All other hardware in the EC-1032 configuration undergoes preliminary aging for several days, whereupon it is received in accordance with the technical delivery terms.

The completed package is subjected to preliminary operation--already in the configuration subject to delivery, for 200 hours, during which the computer implements test tasks or programs provided by the user. The overall [trial] operating time of the main computer and the teledataprocessor is about 900 hours, with allowance for the gain in time due to aging and shock-treatment at high temperatures. This markedly shortens the period of time needed to attain a fixed failure rate.

Until recently the MERA-ELWRO center used to provide general-purpose computers along with (application and tool) software for data processing in the input mode. However, the rapidly growing national economy needs an increasing number of systems for the automation of production and technological processes as well as of data collection and retrieval systems. Hence, in recent years, the Center has been undertaking comprehensive research and development work on the commencement of the production of computer systems adapted to the needs of individual users.

The development and installation--by the IKSAiP (Institute of Computerized Automation and Measurement Systems)--of pilot systems associated with specific facilities are intended to test hardware and software for reliability and suitability for specific types of applications. The experience thus gained will enable the Center to undertake the production and deliveries of the next facility systems for the nation's economy and for export. These systems will be developed mainly on the basis of the following computer hardware:

--JS EMC central computers
--Local peripherals
--Teledataprocessors
--Remote subscriber stations (monitoring screens, printers, remote input stations)
--Special-purpose terminals (for control of banking operations)
--Data concentrators (controllers)
--Equipment for interfacing with facility.

This year the Center is initiating deliveries of a JS EMC teledataprocessing subsystem consisting of the EC-8371 (MERA-ELWRO) teledataprocessor, EC-8575 (MERA-BLONIE) interactive subscriber stations, and MERA 7900 (MERA-ELZAB) remote monitoring screens. It is expected that the subsystem will be complemented with EC-8514 remote input stations, program terminals

(with possibility of local processing), and data concentrators with special-purpose terminals.

All subsystem equipment must interface with any medium- and large-capacity JS EMC computer. There also exists the possibility of interfacing with the teledataprocessors of the various subscriber stations produced in the CEMA countries. Since the computer system will be made available to many users simultaneously and conditions for operation in the interactive mode will be assured, the teledataprocessing subsystem will make possible a broadening of the applications of the computers as well as a marked increase in their effectiveness.

Beginning this year, the CEMA countries are producing second-generation JS EMC computers (the RIAD-2 [series]), which display improved technical and economic parameters and qualitatively new application potential.

The principal improvements in the RIAD-2 computers are:

--A much better capacity/cost coefficient, owing to the application of medium-scale and partially also large-scale integrated circuitry.

--Higher reliability parameters, owing to improved quality control and diagnostics (automatic correction of operating-memory errors, error-free repetition of erroneous operations, microprogram error-locating tests, etc).

--A virtual memory mechanism expanding the operating memory capacity to 16 M bytes for each program.

--More effective input/output channels with multiplex unit transmission.

--A broadened list of instructions for scientific and technical calculations and large database processing.

--The possibility of developing two-processor systems.

--New peripherals, including disk memories with capacities of 100 and 200 M bytes and tape memories with recording density of 1,600 bytes per inch.

--Broad teleprocessing potential.

The teleprocessing system currently produced at the Center will, owing to the possibility of programming the EC-8371 processor, represent the main component of the configurations of RIAD-2 series computers and in the future also of the computers of the next generation of JS EMC (the RIAD-3). The Center is planning to commence within the next few years the deliveries of the EC-1045 computer system which will include, among other things, Soviet-produced hardware as well as Polish-produced teleprocessing equipment.

At the same time, the IKSAiP will work on the third generation JC EMS computers, which will begin to be produced in the mid-1980s. The computers in the RIAD-3 series should display the following refinements compared with computers in the RIAD-2 series:

--Improvement (5- to 10-fold) in productivity.

--Improvement (10- to 100-fold) in reliability parameters.

--Reduction--in half or to one-tenth--in dimensions and required power.

--Common use of large-scale integrated circuitry.

--Elevation in the level of standardization of equipment (functional elements).

--Implementation of certain hardware components of the operating system owing to the developed microprogramming technology.

--Common use of microprocessors.

--Application of special-purpose problem-oriented processors.

--Further development of the mechanism of virtual machines.

--Introduction of distributed-parameter processing on the basis of the use of minicomputer-based program terminals in the systems.

--Possibility of easy organization of computer networks.

--Broadening of the variety of peripherals and a marked improvement in their parameters--e.g. disk memories with capacities of 300-400 M bytes, tape memories with recording density of 6,250 bits per inch, mass optoelectronic memories (capacity 10^{11} bits), and magnetic memories (capacity 10^{12} bits).

--Introduction of problem-oriented software systems.

--Common application of database control systems.

The underlying assumption for the RIAD-3 series--as for the RIAD-2 series, besides--is the preservation of software compatibility. Thus the application software developed for RIAD-1 and RIAD-2 computers can also operate in RIAD-3 computers.

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INSTITUTE FOR CHEMICAL AND BIOCHEMICAL ENERGETICS ESTABLISHED

Bucharest BULETINUL OFICIAL in Romanian Part I No 21, 10 Mar 80 pp 1,2

[Text] The Council of State of the Socialist Republic of Romania decrees:

Article 1--As of 1 March 1980, the Institute for Chemical and Biochemical Energetics is established, with headquarters in Bucharest Municipality, as a component of the Central Institute for Chemistry under the jurisdiction of the Ministry of the Chemical Industry.

The Institute for Chemical and Biochemical Energetics is organized as a scientific research and technological engineering unit without juridical personality, subordinate to the Bucharest Institute for Chemical Research, and has as the purpose of its activity the elaboration of technological procedures and work techniques for obtaining chemical and energy products from resources of biological origin, as well as for the utilization of solar energy and other new sources of energy in the synthesis of chemical products.

Article 2--The Institute for Chemical and Biochemical Energetics has the following principal functions:

a) it works out technological procedures for the chemical utilization of the biomass and of recoverable and reusable agricultural and forestry materials, with the obtaining of hydrocarbons, alcohol fuels, ketones and other chemical products, through chemical and biochemical techniques;

b) it works out technological procedures for obtaining hydrocarbons, proteins, amino acids, pectins and other chemical products from algae and aquatic plants;

c) it works out technological procedures for obtaining hydrogen by photocatalytic and catalytic decomposition of water;

d) it works out technological procedures utilizing solar energy to obtain chemical products by photosynthesis;

e) it carries out research for the achievement of electrochemical sources;

f) it coordinates, for the entire economy, scientific research and technological engineering for the superior utilization of biological resources and the introduction of new sources of energy;

g) it is responsible for the generalization in the economy of the technological procedures and work techniques elaborated.

Article 3--The Institute for Chemical and Biochemical Energetics is organized as a small institute and will come under Level I of remuneration for certified personnel with advanced studies; it is a part of branch group IV.

Article 4--The organization of the Institute for Chemical and Biochemical Energetics is carried out in the framework of the work and remuneration indicators approved for the Ministry of the Chemical Industry for 1980, taking personnel from the ministries specified in the annex*) which is an integral part of the present decree.

In accordance with the development of activity, the number of positions and the necessary investment funds will be assured by the Ministry of the Chemical Industry by annual plans.

Article 5--The Institute for Chemical and Biochemical Energetics will coordinate scientific research activity in the field of chemical and biochemical energetics carried out by the scientific research and technological engineering collectives in the Pitesti wood processing combine, the Cluj-Napoca institute for isotopic and molecular technology, the synthetic fuels research collective in the faculty of food chemistry in Galati University and the specialized research collectives in the institutions of higher education subordinate to the Ministry of Education and Instruction.

The research collectives in these units will operate under double subordination, to the Institute for Chemical and Biochemical energetics for the determination of research themes and to the patron ministries and central institutes for the providing of conditions for executing their tasks.

Article 6--The ministries and other central organs which have under their jurisdiction units with research activity in the domain of the Institute for Chemical and Biochemical Energetics will transfer, upon request, the working cadres, the research themes and the related material base, to the Central Institute for Chemistry, on the basis of an agreement concluded within 30 days of the date of the present decree.

The workers employed under the conditions of paragraph 1 are considered to be transferred in the interest of the job.

Article 7--The State Planning Committee and the Ministry of Finance will submit for approval the modifications, which result from the application

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*) The annex is communicated to the institutions concerned.

of the provisions of the present decree, in the economic and financial indicators of the plan, as well as in the volume and structure of the state budget for 1980.

Article 8--Annexes Nos. 1, 2, 3, and 4 of Council of State Decree No 112/1977 on measures for the organization and operation of the Central Institute for Chemistry--ICECHIM--are supplemented with the Institute for Chemical and Biochemical Energetics.

NOCOLAE CEAUSESCU,

President of the Socialist Republic of Romania

Bucharest, 5 March 1980
No. 61

CSO: 2702

END

SELECTIVE LIST OF JPRS SERIAL REPORTS

EASTERN EUROPE SERIAL REPORTS

EAST EUROPE REPORT: Economic and Industrial Affairs
EAST EUROPE REPORT: Political, Sociological and Military Affairs
EAST EUROPE REPORT: Scientific Affairs

WORLDWIDE SERIAL REPORTS

WORLDWIDE REPORT: Environmental Quality
WORLDWIDE REPORT: Epidemiology
WORLDWIDE REPORT: Law of the Sea
WORLDWIDE REPORT: Nuclear Development and Proliferation
WORLDWIDE REPORT: Telecommunications Policy, Research and Development

END OF FICHE

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